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THERE is probably no infection to which horses are more generally exposed during the months of spring and summer. The germ-laden dirt of streets, barns and stables is a constant menace because of the many foot-injuries—cuts, bruises, nail punctures, etc.—to which the animals are subject.

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"THE VICTORY OVER RABIES."

In a recent number of the Journal of the American Medical Association, under *Current Comment*, a high tribute is paid to the great Pasteur for his classic work in connection with rabies, that dire disease of humanity. Says the Journal:

"Amid the victories of the European battlefields that have thrilled the hearts of all warm-blooded Americans and every lover of democracy throughout the world, we may well pause for a moment to contemplate another type of victory—man's conquest of rabies, the dire disease that once meant a painful end of most of those who were inoculated with its deadly germs. Year after year the reports of the lives saved by the fruits of Pasteur's pioneer labors in combating the microbial enemies of mankind bring the story of the beneficent influence of this great Frenchman's contribution to medical science.

"While the names of great generals and distinguished statesmen are attracting foremost attention in the eyes of all the world, and men are rehearsing the conquests and combats of former great struggles, let us not forget the perennial victory over rabies. During the year 1916, according to a report recently issued, 1,008 persons from the district of Lyons received the antirabic treatment at the bacteriologic institute of that city.

A single death in this list places the mortality at 0.099 per cent. Since 1900, more than 9,000 persons have received antirabic inoculations, with a total of nine deaths, or 0.09 per cent. The story has become an old one; but it will long bear repetition as an eloquent testimony to the blessings of intelligent scientific research."

We take pleasure in reproducing the above tribute to the great Pasteur, and his never-to-be-forgotten work in the cause of humanity in connection with rabies. We feel, however, that there is an additional phase of the work that should not be lost sight of which has been the means of greatly lessening the number of cases of this frightful malady, in both man and the lower animals, by eradicating the infection itself. We refer to the splendid work of those countries which enacted laws, and enforced regulations, to prevent the transmission of the infection, by reducing the possibility of rabid animals, dogs especially, inoculating people and other animals, thereby eliminating the infection of rabies to a very large extent, and rendering the antirabic treatment unnecessary to a considerable degree. It is well known that for years previous to the Great War, rabies infection did not exist in Great Britain or Ireland, having been completely stamped out, although a few cases have occurred there since the opening of hostilities, which, doubtless, were introduced through a weakening of the quarantine restrictions against dogs from other countries during that country's war stress. There are other European states which, we believe, had a similar satisfactory pre-war record with regard to rabies; and there are still others, we think, Australia, for example, in which the infection never obtained a foothold on account of rigid quarantine restrictions being imposed against dogs of any kind entering the country. So, while all credit must be given to the labors of the great Frenchman, the results of which have saved the lives of thousands of human beings before other measures were being adopted, and are still doing so, the work of eliminating the infection, and so preventing the disease, should be given its due meed of credit, and of which a part, at least, if we are not mistaken, belongs to the veterinary profession.

CYANOGENESIS.

A recent technical bulletin from the Oklahoma Experiment Station, giving the results of a Study of the Cyanogenesis in

Sorghum Vulgare, by Dowell of the Department of Chemistry, suggests the fact that many animals are annually lost, more particularly cattle, as the result of the development of prussic acid in different varieties of plants, and in different localities.

In this country sorghum seems to have attracted most attention, although in other countries, and in some sections of this country, many fatalities occur from the development of this rapidly-poisonous acid, or glucoside, in at least some of the members of the legume family. In the Gulf States region, and especially on some of the bottom lands of the Lower Mississippi Valley, prussic acid poisoning is not at all uncommon amongst cattle grazing on old cow-pea (Dolichos) fields during winter, and especially after a frost; while on the higher lands in the same region, no trouble seems to be experienced from this cause.

Again, while there may be occasional deaths reported from the consumption of "stunted" sorghum, in the Gulf States, they are by no means so frequent as are reported from other sections of the country. In fact, the writer has known of sorghum having been fed in all stages and conditions to farm animals of different varieties without any untoward results whatever.

We have seen reports from European countries of fatalities occurring in cattle from this cause that were fed meal made from Burmah beans, and perhaps some other legumes, chemical analyses having shown the presence of the poisonous principle in the feeding material. Without touching upon the chemistry involved, one would almost be led to believe that the locality and the character of the soil had something to do with the elaboration and development of the glucoside, or the acid, in particular varieties of plants which seem to harbor it, and prove so dangerous to animals consuming them. We have known of cases where, on the same farm, pea vines grazed on bottom lands would prove fatal; while the same variety of peas grown on the higher lands would be altogether innocuous.

Death is usually so sudden that it is almost impossible to obtain any benefit from therapeutic measures, animals dropping dead "in their tracks," so to speak. However, it is possible to lessen, to some degree at least, the number of fatalities by the adoption of precautionary or preventive measures on the part of stockowners. But first of all, and this is the point we are desirous of stressing, viz., that the veterinarian should make himself familiar with this condition in parts of the country where

it occurs, and be able to intelligently advise his client just how to proceed so that he may make the value of his professional knowledge felt in the prevention of a loss in animals that frequently assumes quite large proportions; and as therapeutic measures seem almost, if not altogether, out of the question, one of the first suggestions would be to avoid the use of such fields at a season of the year when grazing on them is dangerous, and turn the growth under for the preparation of some other crop. Or the utilization of the grazing up to the time only when it is apparently comparatively safe, or before the first frost in the Southern section of the country at least.

Another method which seems to have found favor is to permit cattle to partially "fill up" on some other feed before turning them on to these "poisoned fields," in which case the quantity of the dangerous ingesta would be materially lessened, and the untoward results somewhat modified. It has been found also that when conditions were such that cattle were deprived of water for some time in these pea-vine pastures, that the acid seemed to take effect only after the animals had quenched their thirst by partaking of copious draughts of water, when they would die quite suddenly, probably due to dilution of the relatively dry ingesta and rendering the poisonous principle more capable of absorption.

We mention these few illustrations to show that while the veterinarian may be more or less helpless as a therapeutist under such conditions, he may be of untold benefit to the stockowner at times in preventing him incurring very serious losses, if he will only familiarize himself with the predisposing causes which help to bring them about. To the owner of a large number of cattle, the saving of them by preventive measures is a big thing. To the veterinarian who is the means of the stockowner's success, it means a big thing to him also. In fact, it is the big things that count, in veterinary practice as in any other line of endeavor, and are most likely to impress the laity with the real value of the profession. Success in minor matters has its good effect; but success in the larger problems with which the veterinarian has to deal leaves its relatively greater impress upon the minds of those with whom he has to come in contact in his professional capacity.

Dr. A. D. Kendrick has been discharged from the army and has resumed his practice at Homer, La.

STUDIES ON THE HYPERIMMUNIZATION OF HOGS AGAINST HOG CHOLERA.

M. Dorset, C. N. McBryde, W. B. Niles, J. H. Rietz,
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United States Department of Agriculture.

INTRODUCTION.

The anti-hog-cholera serum which is now widely used for the prevention and treatment of hog cholera is produced from immune hogs by injecting them with large quantities of defibrinated blood obtained from hogs sick of hog cholera. The blood of the immunes is subsequently drawn, and a preservative added, and this constitutes the serum which is used in practice. In an early publication* the process of hyperimmunization is described as being carried out in two ways: (1) The quick method, which consisted of the injection subcutaneously into an immune hog of an amount of disease-producing blood equivalent to 10 c.c. for each pound of body weight; and (2) the slow method, which consisted of the injection of the immune first with 1 c.c. of disease-producing blood subcutaneously for each pound of body weight, followed after an interval of 10 to 14 days by a second dose, amounting to 2½ c.c. for each pound of body weight, and this in turn was followed by a third injection given approximately 12 days after the second, in the proportion of 5 c.c. of disease-producing blood per pound of body weight.

As will be seen, the injections were made subcutaneously and, in the quick method, 10 c.c. of disease-producing blood per pound of body weight were required to accomplish hyperimmunization, while in the slow method a total of 8.5 c.c. of disease-producing blood per pound of weight were required. There were certain objections to both of these processes.

The quick method required the subcutaneous injection of very large amounts of defibrinated virus blood, the task being found to be difficult to perform and resulting frequently in the development of large subcutaneous abscesses. In the case of the slow method abscesses were likewise produced at times and furthermore a very long period was required to secure hyperimmunization, the time being at least 32 days before the hyperimmunized

* Dorset, M., McBryde, C. N., and Niles, W. B. "Further Experiments Concerning the Production of Immunity from Hog Cholera," Bulletin 102, U. S. Department of Agriculture, B. A. I., January 18, 1908.

hog was available as a serum producer. In order to overcome these objections, the intravenous method of administration was resorted to, and it was shown* that immune hogs could be hyperimmunized satisfactorily by the administration of a single dose of disease-producing blood intravenously, in the proportion of 5 c.c. per pound of body weight. This method of hyperimmunization resulted in eliminating entirely the objections named above and has been, from the beginning, employed in the commercial preparation of anti-hog-cholera serum. In the earlier experimental work hogs which had been immunized artificially by the injection of virus and serum, as well as hogs, which appeared to be natural immunes, or which had recovered from an attack of the disease, were hyperimmunized and their serum tested. It was found that all three classes of immunes yielded a potent serum.

In the early work no consideration was given to the possibility that the length of time elapsing between immunization on the one hand and hyperimmunization on the other might have an important influence upon the potency of the serum. It is a fact, however, as may be seen from the record given in Bureau of Animal Industry Bulletin 102†, that intervals of from 6 to 13 months elapsed between the original immunizations and the hyperimmunizations. In all cases where a proper amount of disease-producing blood was used for hyperimmunization the serum proved to be of satisfactory potency.

In a report for the years 1910 and 1911, Holmes‡ describes certain experiments with improved methods of anti-rinderpest serum preparation. Prior to the time when these experiments were carried out by Holmes, it was customary to produce anti-rinderpest serum by giving susceptible cattle a simultaneous injection of virulent blood and a suitable amount of anti-rinderpest serum. About three weeks thereafter the cattle were given one massive injection of defibrinated virulent blood in an amount equivalent to 10 c.c. per pound of body weight, or they were hyperimmunized by a first injection of about 3.5 c.c. per pound of body weight, this being followed after a period of two to three weeks by a second injection of virulent blood in the proportion of from 7 to 10 c.c. per pound body weight. All of these injec-

* Report of Chief of Bureau of Animal Industry for 1909, p. 53, U. S. Department of Agriculture, 1911.

† L. c.

‡ Indian Civil Vet. Dept., Memoirs No. 3, Rept. of the Research Work of the Imperial Bacteriological Laboratory, Muktesar, during 1910 and 1911.

tions were made subcutaneously. Holmes states that when a susceptible animal is immunized against rinderpest by the simultaneous inoculation of serum and virus it passes through a period of hypersusceptibility which he calls the "negative phase." This is followed by a period of resistance to the disease—"positive phase."

According to Holmes, cattle which were hyperimmunized three weeks after receiving the simultaneous inoculation, received the hypering dose after they had passed through the "negative phase" of the immunity and were in the "positive phase." His conception was that the injection of the massive amounts of virulent blood required in hyperimmunization during the negative phase of immunity—that is, before the body cells of the animal had produced the antitoxin in any considerable quantities—would result in a maximum stimulation of the body cells and therefore in the development of a serum of maximum potency. He believed that when the hyperimmunizing injection was made during the period of positive immunity, the virus, which was injected, combined in part, at least, with the antitoxin which had been developed as a result of the previous immunizing dose and for that reason the stimulation of the cells concerned in antitoxin production was not obtained to the desired extent. In the same paper Holmes describes experiments with virulent blood diluted with 0.5% potassium citrate solution in comparison with defibrinated virulent blood, undiluted, which had been in common use.

As a result of his experiments he reports that hyperimmunization during the negative phase, while the animals were passing through a modified attack of rinderpest as a result of the simultaneous inoculation, resulted in a more potent serum than was obtained by waiting until the reaction following the simultaneous injection has passed away. He furthermore states that a more potent serum is obtained when virus blood is drawn directly into 0.5% potassium citrate solution and injected after hemolysis of the red cells has taken place than was secured by the injection of an equivalent amount of undiluted defibrinated blood. He attributes his success with the diluted blood to the fact that the virus is partially, at least, freed from the red cells through the process of hemolysis, and also to the fact that the diluted blood is more quickly absorbed, thus producing a more rapid effect on the injected animal.

EXPERIMENTAL WORK.

The above described work of Holmes suggested to us that perhaps certain improvements could be made in the production of anti-hog-cholera serum. Perhaps a more potent serum could be obtained if the hyperimmunizing injection was made at the so-called "negative phase" of immunity; or it might be that a considerable saving could be effected by injecting a smaller amount of virulent blood at the time of the negative phase, thus securing a serum as potent as that produced by the ordinary methods but with a smaller expenditure of virulent blood, which is one of the principal items of cost in the production of anti-hog-cholera serum. Furthermore, it seemed possible that hemolysis of the virus blood used for hyperimmunization would result in the production of a more active antigen than the undiluted defibrinated blood which was in common use. The advantage of rapid absorption of the diluted virus blood, upon which considerable stress is laid by Holmes in his work on rinderpest, could not be expected in anti-hog-cholera serum production, because the common practice is to make the hyperimmunizing injection intravenously, thus securing a rapid dissemination of the virus throughout the body. It appears that hyperimmunization by intravenous injection has not been practiced in producing anti-rinderpest serum. The plain advantages of the intravenous injection in the production of anti-hog-cholera serum would seem to indicate the employment of that method in producing anti-rinderpest serum.

In order to obtain immunes of proper weight and condition for hyperimmunization it has been the practice of this Bureau to feed and bring to proper size the pigs which have come through serum tests in good condition. In the serum tests these pigs receive subcutaneously 15, 20 or 25 c.c. each of serum and 2 c.c. each of virus. They may show during the test a temperature reaction with some loss of appetite, but in most cases they show no visible symptoms and no temperature reaction. These serum-test pigs weigh from fifty to eighty pounds when released from the tests and from one hundred and fifty to two hundred pounds when they are ready for hyperimmunizing, the interval between immunization and hyperimmunization being anywhere from three to six months. This plan of utilizing test pigs is followed by a number of commercial serum plants, which are thus assured of a supply of immune pigs of the proper weights for hyper-

immunization. If potent serum could be secured by hyperimmunizing immune hogs within a short interval after they are immunized, this practice of holding the test pigs could be done away with, thus effecting a saving of time and cost.

HYPERIMMUNIZATION AT THE NEGATIVE PHASE.

In carrying out the experiments, a number of susceptible pigs were first given simultaneous inoculations of serum and virus and were later hyperimmunized after intervals of 1 day, 2 days, 5 days, 7 days, 9 days, 10 days, and 3, 4, 5, 6, 7 and 8 weeks, respectively. At the 1 day, 2 day and 5 day intervals the pigs were hyperimmunized with 5 c.c. of virus per pound; at the 7 day, 9 day, and 10 day intervals one pig was given the regular hyperimmunizing injection of 5 c.c. of virus per pound and another pig was given 2.5 c.c. of virus per pound, or one-half of the regular hyperimmunizing injection; while at the longer intervals 1 pig was given 5 c.c. of virus per pound. These pigs, which may be termed "short-interval immunes," weighed from 95 to 205 pounds at the time of hyperimmunization.

The same viruses which were used for the hyperimmunization of the short-interval immunes were also, at the same time, used for the hyperimmunization of "regular immunes," that is, pigs which had been through serum tests and had thus received the simultaneous treatment when they weighed from 40 to 65 pounds. They showed no symptoms of illness following this treatment and were not again exposed to disease until virus was administered for hyperimmunization. At the time of hyperimmunization these regular immunes weighed from 163 to 210 pounds and were therefore approximately of the same weight as the short-interval immunes. The interval between the immunization and the hyperimmunization of the regular immunes was from three to six months. These hogs were hyperimmunized in order that we might have a control on the antigenic properties of each of the lots of virus used in the hyperimmunization of the short-interval immunes. The regular immunes were hyperimmunized and bled on the same dates as the corresponding short-interval immunes and the serums thus obtained were tested for potency in the same way as those obtained from the short-interval immunes. The records of all of the short-interval and of the regular immunes from which serums were obtained are shown in Table 1.

TABLE 1.

SHORT-INTERVAL AND REGULAR IMMUNES FROM WHICH SERUMS WERE OBTAINED.

Hog	Record of Immunization		Interval Between Immunization and Hyperimmunization	Record of Hyperimmunization		
	Serum Dose (c.c.)	Virus Dose (c.c.)		Weight When Hyperimmunized (lbs.)	Dose Virus per Pound Weight of Immune (c.c.)	Total Amount Virus Injected (c.c.)
3374	60	2	1 day	145	5	725
3378	60	2	2 days	170	5	850
3404	†	2	‡3 months	230	5	1150
4794	60	2	5 days	205	5	1025
4845	†	2	‡3 months	180	5	900
3291	40	2	7 days	115	5	575
3294	40	2	7 days	95	2.5	237.5
4859	†	2	‡3 months	210	5	1050
3295	40	2	9 days	99	5	495
3293	40	2	9 days	109	2.5	272.5
4785	†	2	‡3 months	192	5	960
3290	40	2	10 days	127	5	635
3292	40	2	10 days	119	2.5	297.5
4787	†	2	‡3 months	207	5	1035
3589	40	2	3 weeks	150	5	750
3603	†	2	‡3 months	182	5	910
3586	40	2	4 weeks	127	5	635
3956	†	2	‡3 months	218	5	1090
3584	40	2	5 weeks	153	5	765
3615	†	2	‡3 months	180	5	900
3587	40	2	6 weeks	156	5	780
3616	†	2	‡3 months	195	5	975
3588	40	2	7 weeks	167	5	835
3617	†	2	‡3 months	192	5	960
3590	40	2	8 weeks	158	5	790
3630	†	2	‡3 months	190	5	950

† These hogs were immunized in serum tests when they were shoats weighing from 40 to 65 pounds and received at that time from 15 to 25 c.c. of serum with 2 c.c. of virus.

‡ The interval between immunization and hyperimmunization of these hogs varied from 3 to 6 months; the exact time that elapsed in each case is not recorded.

Two weeks after hyperimmunization, all of the hyperimmunized hogs, both the regular and the short-interval immunes, were bled and serum was prepared from each in the usual manner by defibrinating the blood and adding 0.5% of phenol.

These serums were tested on susceptible pigs, a serum from a regular immune being compared in each instance with the serum from one of the short-interval immunes. In carrying out the tests of the different serums susceptible pigs weighing from 35 to 85 pounds each were used. Six pigs were used in testing each

serum, two pigs received 5 c.c. each of serum, subcutaneously, two received 10 c.c. each, and two received 15 c.c. each. Each pig at the same time received a subcutaneous injection of 2 c.c. of virus in the groin opposite to that in which the serum was injected. A certain number of pigs were injected with the virus alone to serve as controls. In several instances two or more serums were tested at a time, so as to reduce the number of virus controls.

Tables 2 and 3 afford a comparison between the serums obtained from the short-interval immunes and those obtained from the regular (long-interval) immunes.

TABLE 2.

PROTECTION AFFORDED BY SERUMS FROM SHORT-INTERVAL IMMUNES.

Hog No.	Interval Between Immunization and Hyperimmunization	*Protection Afforded by Serum Against 2 c.c. Virus.		
		5 c.c. Serum	10 c.c. Serum	15 c.c. Serum
3374	1 day	None	None	None
3378	2 days	None	None	None
4794	5 days	None	None	None
†3294	7 days	None	None	‡Partial
3291	7 days	None	‡Partial	‡Partial
†3293	9 days	None	None	None
3295	9 days	None	None	Complete
†3292	10 days	None	None	None
3290	10 days	None	None	None
3589	3 weeks	None	None	Complete
3586	4 weeks	Partial	Partial	Complete
3584	5 weeks	Complete	Complete	Complete
3587	6 weeks	None	None	None
3588	7 weeks	Complete	Complete	Complete
3590	8 weeks	None	Complete	Complete

* Complete protection means that neither of the test pigs showed any visible symptoms of sickness; partial protection, that one or both of the test pigs became sick but recovered; no protection, that one or both of the test pigs died from hog cholera.

† These hogs were hyperimmunized with only 2.5 c.c. of virus per pound body weight.

‡ There was only slight loss of appetite in these pigs (see TABLE 4).

TABLE 3.

PROTECTION AFFORDED BY SERUMS FROM REGULAR (LONG-INTERVAL) IMMUNES.

Hog No.	Interval Between Immunization and Hyperimmunization	*Protection Afforded by Serum Against 2 c.c. virus.		
		5 c.c. Serum	10 c.c. Serum	15 c.c. Serum
3404	More than 3 mos.	Complete	Complete	Complete
4845	do.	Complete	Complete	Complete
4859	do.	Complete	Complete	Complete
4785	do.	None	Complete	Complete
4787	do.	Complete	Complete	Complete
3603	do.	Complete	Complete	Complete
3956	do.	Complete	Complete	Complete
3615	do.	Complete	Complete	Complete
3616	do.	Complete	Complete	Complete
3617	do.	Complete	Complete	Complete
3630	do.	None	Complete	Complete

* Complete protection means that neither of the test pigs showed any visible symptoms of sickness; partial protection, that one or both of the test pigs became sick but recovered; no protection, that one or both of the test pigs died from hog cholera.

The results shown in Tables 2 and 3 are very striking. Every one of the eleven regular long-interval immunes yielded a serum of good potency, while only one hog among the thirteen that were hyperimmunized within six weeks after simultaneous inoculation yielded a serum potent enough for use in practice. A closer examination of Tables 2 and 3, as well as of those which follow, shows that there was almost complete lack of potency in the serums from the hogs that were hyperimmunized within ten days after they were immunized. Of the nine hogs hyperimmunized during that period, three (Nos. 3294, 3293 and 3292) were given only half as much virus per pound of body weight as was given to the other hogs in this group and to the regular long-interval immunes. These three hogs are therefore excluded from consideration in the discussion of the results of serum tests.

The serums from the six hogs that received 5 c.c. of virus blood per pound within 10 days after immunization were tested on 36 susceptible pigs, six pigs for each serum (see Table 4). Of these test pigs 29, or 80.5%, died of hog cholera. There is an indication that some of these serums had a slight protective value, but in none of them was this evident in a degree comparable to that shown by the serums from the regular (long-interval) immunes.

TABLE 4.

TESTS OF SERUMS FROM HOGS HYPERIMMUNIZED WITHIN TEN DAYS OF IMMUNIZATION.

Serum Dose	Virus Dose	No. of Pigs Injected	Result
Serum from Hog 3374, Hyperimmunized 1 Day After Immunization.			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 3378, Hyperimmunized 2 Days After Immunization.			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 4794, Hyperimmunized 5 Days After Immunization.			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
*** Serum from Hog 3294, Hyperimmunized 7 Days After Immunization.**			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	1 died of hog cholera; 1 slight loss of appetite, recovered.
15 c.c.	2 c.c.	2	Both showed slight loss of appetite; otherwise well.
Serum from Hog 3291, Hyperimmunized 7 Days After Immunization.			
5 c.c.	2 c.c.	2	1 died of hog cholera; 1 sick, recovered.
10 c.c.	2 c.c.	2	Both showed slight loss of appetite; otherwise well.
15 c.c.	2 c.c.	2	do.
*** Serum from Hog 3293, Hyperimmunized 9 Days After Immunization.**			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	1 died of hog cholera; 1 slightly sick; recovered.

* These serums were from hogs hyperimmunized with only 2.5 c.c. virus per pound of body weight.

Serum Dose	Virus Dose	No. of Pigs Injected	Result
Serum from Hog 3295, Hyperimmunized 9 Days After Immunization.			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	Both remained well.
* Serum from Hog 3292, Hyperimmunized 10 Days After Immunization.			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	1 died of hog cholera; 1 sick but recovered.
Serum from Hog 3290, Hyperimmunized 10 Days After Immunization.			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.

* These serums were from hogs hyperimmunized with only 2.5 c.c. virus per pound of body weight.

The serums obtained from the hogs that were hyperimmunized from three to six weeks after immunization (see Table 5) were somewhat more potent than those from the preceding group of pigs, yet they were, on the whole, distinctly inferior to the serums from the regular immunes. Of 24 pigs used to test these serums 5, or 20.8%, died of hog cholera, in spite of the fact that some had received the larger doses of serum (10 c.c. to 15 c.c.).

The serums from the pigs that were hyperimmunized 7 and 8 weeks respectively, after immunization (see Table 5) appeared to be of good potency, as only one test pig out of 12 (8.3%) died and that one received the smallest serum dose.

TABLE 5.

TESTS OF SERUMS FROM HOGS HYPERIMMUNIZED FROM THREE TO EIGHT WEEKS AFTER IMMUNIZATION.

Serum Dose	Virus Dose	No. of Pigs Injected	Result
Serum from Hog 3589, Hyperimmunized 3 Weeks After Immunization.			
5 c.c.	2 c.c.	2	1 died of hog cholera; 1 sick, recovered.
10 c.c.	2 c.c.	2	1 died of hog cholera; 1 remained well.
15 c.c.	2 c.c.	2	*Both remained well.
Serum from Hog 3586, Hyperimmunized 4 Weeks After Immunization.			
5 c.c.	2 c.c.	2	Both slightly sick; recovered.
10 c.c.	2 c.c.	2	1 remained well; 1 sick, recovered.
15 c.c.	2 c.c.	2	Both remained well.
Serum from Hog 3584, Hyperimmunized 5 Weeks After Immunization.			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 4845 (Control on Short-Interval Hyperimmune 4794).			
5 c.c.	2 c.c.	2	1 died of hog cholera; 1 very sick, survived in unthrifty condition.
10 c.c.	2 c.c.	2	1 died of hog cholera; 1 very sick, survived in unthrifty condition.
15 c.c.	2 c.c.	2	1 died of hog cholera; 1 remained well.
Serum from Hog 3588, Hyperimmunized 7 Weeks After Immunization.			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 3590, Hyperimmunized 8 Weeks After Immunization.			
5 c.c.	2 c.c.	2	1 died of hog cholera; 1 remained well.
10 c.c.	2 c.c.	2	Both remained well.
15 c.c.	2 c.c.	2	do.

* "Remained well" means that the pigs showed no visible symptoms of sickness; in some instances pigs so reported showed a temperature reaction.

Serums were obtained from eleven regular (long-interval) immunes and these were tested in groups along with the serums from the short-interval immunes, the same virus being used for the test pigs in both groups. A total of 66 test pigs were used for the regular immune serums and two of these (3.3%) died during the tests. The two which died each received only the smallest dose of serum. (See Table 6.)

TABLE 6.

TEST OF SERUMS FROM HOGS HYPERIMMUNIZED FROM THREE TO SIX MONTHS AFTER IMMUNIZATION.

Serum Dose	Virus Dose	No. of Pigs Treated	Result
Serum from Hog 3404 (Control on Short-Interval Hyperimmune 3378).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 4845 (Control on Short-Interval Hyperimmune 4794).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 4859 (Control on Short-Interval Hyperimmune 3291).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 4785 (Control on Short-Interval Hyperimmune 3295).			
5 c.c.	2 c.c.	2	1 died of hog cholera; 1 slightly sick, recovered.
10 c.c.	2 c.c.	2	Both remained well.
15 c.c.	2 c.c.	2	do.
Serum from Hog 4787 (Control on Short-Interval Hyperimmune 3290).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 3603 (Control on Short-Interval Hyperimmune 3589).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.

Serum Dose	Virus Dose	No. of Pigs Treated	Result
Serum from Hog 3956 (Control on Short-Interval Hyperimmune 3586).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 3615 (Control on Short-Interval Hyperimmune 3584).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 3616 (Control on Short-Interval Hyperimmune 3587).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 3617 (Control on Short-Interval Hyperimmune 3588).			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 3630 (Control on Short-Interval Hyperimmune 3590).			
5 c.c.	2 c.c.	2	1 died of hog cholera; 1 sick, but recovered.
10 c.c.	2 c.c.	2	Both remained well.
15 c.c.	2 c.c.	2	do.

As a control on the virus used in the tests, several susceptible pigs were always inoculated with the same virus in the same dose as that used for the test pigs. Table 7 gives the results of these injections. It will be noted that all of these controls developed hog cholera. A large proportion were killed in order that their blood might be used in other experiments. The early slaughter of these controls prevents a determination of the actual death rate that would have occurred had the pigs not been killed. The fact that they were utilized for virus production shows that they developed acute and rapid disease with sustained high temperatures and past experience leads us to believe that at least 95% would eventually have succumbed had not the course of the disease been interfered with. As may be seen from the table, all

of the controls exhibited distinct lesions of hog cholera at autopsy.

TABLE 7.

VIRUS CONTROLS ON TESTS OF SERUMS FROM SHORT-INTERVAL AND LONG-INTERVAL IMMUNES.

Pig No.	Wt. (lbs.)	Virus Dose (c.c.)	Killed for Virus	Autopsy Findings.
Virus Used in Testing Serums from Hogs 3374, 3378, 3404, 4794 and 4845.				
1902	60	2	6th day	Well marked lesions of hog cholera.
1903	55	2	6th day	do.
1904	55	2	6th day	do.
1905	55	2	6th day	do.
Virus Used in Testing Serums from Hogs 3291, 3294 and 4859.				
1569	35	2	7th day	Well-marked lesions of hog cholera.
1570	43	2	7th day	do.
1571	55	2	7th day	do.
1572	56	2	7th day	do.
Virus Used in Testing Serums from Hogs 3295, 3293 and 4785.				
1648	47	2	7th day	Well-marked lesions of hog cholera.
1649	58	2	7th day	do.
1650	40	2	7th day	do.
Virus Used in Testing Serums from Hogs 3290, 3292 and 4787.				
1811	45	2	9th day	Well-marked lesions of hog cholera.
1812	45	2	9th day	do.
1813	80	2	7th day	do.
1814	55	2	7th day	do.
Virus Used in Testing Serums from Hogs 3589 and 3603.				
2429	45	2	8th day	Well-marked lesions of hog cholera.
2430	60	2	17th day*	Extensive lesions of hog cholera.
Virus Used in Testing Serums from Hogs 3586 and 3956.				
2795	60	2	20th day†	Extensive lesions of hog cholera.
2797	50	2	13th day†	Well-marked lesions of hog cholera.

Pig No.	Wt. (lbs.)	Virus Dose (c.c.)	Killed for Virus	Autopsy Findings.
Virus Used in Testing Serums from Hogs 3584, 3615, 3588 and 3617.				
3050	40	2	8th day	Slight lesions of hog cholera.
3051	60	2	8th day	Well-marked lesions of hog cholera.
3052	60	2	13th day†	Extensive lesions of hog cholera.
Virus Used in Testing Serums from Hogs 3587 and 3616.				
2825	50	2	7th day	Well-marked lesions of hog cholera.
2826	50	2	8th day	do.
2827	50	2	8th day	do.
Virus Used in Testing Serums from Hogs 3590 and 3630.				
2845	70	2	28th day*	Slight lesions of hog cholera.
2846	70	2	10th day	do.

* Killed in moribund condition.
† Died.

From the above results, it is evident that in the case of hog cholera, hyperimmunization shortly after immunization, or during the so-called "negative phase," is undesirable because it results in the production of very inferior serum. It appears that, as a rule, and within certain limits, the longer the interval that elapses between immunization, on the one hand, and hyperimmunization, on the other, the more potent the serum. These results have been surprising in view of the success of Holmes* in producing a highly potent anti-rinderpest serum by hyperimmunization at the "negative phase" within 10 days after immunization.

In this connection it is interesting to recall the findings of Park and Zingher† in their work on the active immunization of children against diphtheria by injection of mixtures of toxin and antitoxin. They found that children who were naturally immune responded promptly and strongly to the immunizing dose by the production of antitoxin, whereas less than 25 per cent of those who possessed no natural immunity responded within four weeks to the same injection. In our own work we have been dealing

* L. c.
† Park, W. H., and Zingher, A. Active Immunization in Diphtheria and Treatment by Toxin-Antitoxin. Jour. Amer. Med. Asso., Vol. 63, No. 10, p. 859, Sept. 5, 1914, and Active Immunization with Diphtheria Toxin-Antitoxin. Jour. Amer. Med. Asso., Vol. 65, No. 26, p. 2216, Dec. 25, 1915.

with a living virus along with what may be assumed to be a toxin that exists in the blood of sick pigs and we have used no antitoxin in the operation of hyperimmunizing; therefore our experiments cannot be regarded as strictly analogous to those of Park and Zingher. However, the results we have obtained are very similar, for we find in hog cholera that susceptibility to immunizing response is a very different thing from susceptibility to disease and we might almost conclude that they are in a degree, in inverse proportion, the greater the susceptibility to infection the less the susceptibility to immunizing response and vice versa.

We have been unable to notice any marked physical signs of "negative phase" following the simultaneous inoculation of susceptible pigs, provided, of course, a sufficient dose of serum is used. In some individuals there may be a transient rise of temperature a few days after inoculation, but nothing more if the work is properly done. Defibrinated blood from a pig affected with a virulent strain of hog cholera, such as was used in our experiments, is usually fatal to susceptible pigs when given in doses of 1/100 c.c. or even less. The records given above show that we have been able regularly to administer from 50,000 to 100,000 times that dose to pigs within ten days after simultaneous inoculation without producing any marked reaction. To our minds, this seems to prove that there is no "negative phase" or stage of increased susceptibility to disease, following simultaneous inoculation against hog cholera, and that the state of increased susceptibility to immunizing response is not fully developed, as a rule, until the lapse of seven weeks or more after simultaneous inoculation.

HYPERIMMUNIZATION WITH DILUTED AND LAKED VIRUS BLOOD.

As has been stated previously, Holmes* reported that rinderpest virus diluted with hypotonic citrate solution was more satisfactory for hyperimmunization than the undiluted defibrinated blood. He believed this was due in part to the freeing of virus from the red blood cells through hemolysis and in part to the more rapid absorption of the diluted virus, the hyperimmunizing dose in anti-rinderpest serum production being given simultaneously.

In anti-hog-cholera serum production the hyperimmunizing dose is given intravenously, hence rapid dissemination, even of

* L. c.

the undiluted defibrinated blood is assured, but since there was a possibility that through hemolysis a greater amount of the antigen would be made immediately available, we have hyperimmunized several immunes with diluted virus in order to compare serum produced in that way with serum secured by the common practice of injecting the undiluted defibrinated blood.

1. *Virus blood diluted with citrate solution.* Blood was drawn from pigs sick of hog cholera directly into a solution containing 0.5 per cent of potassium citrate and in sufficient amount to give a mixture consisting of equal parts of blood and citrate solution. A portion of the blood from the pigs which furnished this virus was drawn into separate containers and defibrinated without any addition whatever. These two lots of virus, one consisting of the diluted whole blood and the other of the undiluted defibrinated blood, were used to hyperimmunize five regular, "long-interval" immunes. All hyperimmunizing injections were made intravenously, as follows:

Immune hog 4779 was hyperimmunized with 5 c.c. per pound of fresh citrated virus blood.

Immune hog 4781 was hyperimmunized with 10 c.c. per pound of fresh citrated virus blood.

Immune hog 3298 was hyperimmunized with 5 c.c. per pound of citrated virus blood that had been held in a cool place for 24 hours.

Immune hog 4786 was hyperimmunized with 5 c.c. per pound of citrated virus blood that had been held in a cool place for 3 days.

Immune hog 4782 was hyperimmunized with 5 c.c. per pound of undiluted defibrinated virus blood.

The citrated virus blood used to hyperimmunize hogs 3298 and 4786 was held for a time after preparation to determine whether standing and, therefore, more complete hemolysis, would increase its antigenic properties.

Fourteen days after hyperimmunization, each of the above hyperimmunes was bled and serum prepared from each in the usual manner by defibrination of the blood and the addition of 0.5 per cent phenol. The five different serum lots were tested on susceptible pigs in doses of 5 c.c., 10 c.c., and 15 c.c., against 2 c.c. of virus blood. Control pigs were injected with the virus blood alone.

The results of the serum tests are shown in *Table 8.*

TABLE 8.

TESTS OF SERUMS FROM HOGS HYPERIMMUNIZED WITH CITRATED VIRUS BLOOD.

Serum Dose	Virus Dose	No. of Pigs Treated	Result.
Serum from Hog 4779, Hyperimmunized with Fresh Citrated Virus Blood.			
5 c.c.	2 c.c.	2	Both showed slight loss of appetite, otherwise well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Serum from Hog 4781, Hyperimmunized with Fresh Citrated Virus Blood.			
5 c.c.	2 c.c.	2	1 remained well; other slightly sick, recovered.
10 c.c.	2 c.c.	2	Both slightly sick, recovered.
15 c.c.	2 c.c.	2	Both remained well.
Serum from Hog 3298, Hyperimmunized with Citrated Virus Blood Held for 24 Hours.			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	Both remained well.
15 c.c.	2 c.c.	2	1 remained well; other showed only slight loss of appetite.
Serum from Hog 4786, Hyperimmunized with Citrated Virus Blood Held for 3 Days.			
5 c.c.	2 c.c.	2	1 died of hog cholera; other showed only slight loss of appetite.
10 c.c.	2 c.c.	2	Both showed only slight loss of appetite.
15 c.c.	2 c.c.	2	1 died of hog cholera; other showed only slight loss of appetite.
Serum from Hog 4782, Hyperimmunized with Undiluted Defibrinated Virus Blood.			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.

TABLE 9.

VIRUS CONTROLS ON TESTS OF SERUMS FROM HOGS HYPERIMMUNIZED WITH CITRATED VIRUS BLOOD.

Pig No.	Wt. (lbs.)	Virus Dose (c.c.)	Killed for Virus	Autopsy Findings.
1569	35	2	7th day	Well-marked lesions of hog cholera.
1570	43	2	7th day	do.
1571	55	2	7th day	do.
1572	56	2	7th day	do.

Of 24 pigs used to test the potency of the serums from the immunes that received the citrated virus blood 18, or 75%, became sick and 4, or 16⅔%, died. All of the six pigs (100%) that were given serum from immunes hyperimmunized with undiluted defibrinated blood remained well.

All of the pigs injected with virus alone as controls on the serum test (see Table 9) contracted acute hog cholera and were killed on the 7th day after inoculation in order that their blood might be used in other experiments.

Three of the immunes that were given the citrated virus blood received 5 c.c. per pound and one received 10 c.c. per pound, so that, of actual virus blood three received 2.5 c.c. per pound and one 5 c.c. per pound. From the tests it will be seen that the serum from the immune that was given the largest dose of citrated virus blood was no better than that from the immunes which received only half as much. The serum from the immune that was hyperimmunized with the undiluted defibrinated virus blood was distinctly more potent than those from the immunes hyperimmunized with the citrated virus blood.

2. *Virus blood diluted with water.* If the antigenic properties of virus blood could be increased by dissolution of the red blood cells it would be reasonable to expect that the degree of increase would depend upon the extent of the dissolution. We have endeavored to obtain a more complete hemolysis by drawing the virus blood directly into distilled water and by mixing defibrinted virus blood with distilled water. The experiment was carried out as follows:

Blood was drawn from four sick pigs into sterile bottles containing sterile, distilled water. Two hundred cubic centimeters of blood was drawn from each pig into an equal amount of water, the blood of each pig being caught in a separate bottle. The re-

maining blood from each of the virus pigs was then collected in separate bottles, defibrinated, strained through sterile gauze, and mixed. The bottles containing the diluted blood and the mixed defibrinated blood were placed in a cooler and allowed to remain for twenty-four hours.

At the end of three hours the bottles containing the diluted blood were shaken sufficiently to loosen the clots from the sides of the bottles. At the end of twenty-four hours the serum had separated well in these bottles and the clots had contracted and were floating at the surface. The bottles were then shaken in order to break up the clots. The contents of the four bottles were next strained through four thicknesses of sterile gauze into the same bottle and thoroughly mixed. Sodium chloride in the proportion of 0.4 per cent was added to produce a normal solution and the diluted blood was then used for the hyperimmunization of an immune hog.

The defibrinated blood which had been collected at the same time from the same sick pigs was divided into two parts, one part being diluted with an equal volume of sterile distilled water. After hemolysis, sodium chloride was added in the proportion of 0.4 per cent. This diluted, defibrinated virus blood was likewise used for the hyperimmunization of a second immune hog. A third immune was hyperimmunized with the remaining portion of defibrinated virus blood, undiluted.

The three hogs which were hyperimmunized in this experiment were as follows:

Hog 3569 was hyperimmunized with 5 c.c. per pound of whole virus blood plus an equal volume of distilled water with 0.4% of sodium chloride added.

Hog 3570 was hyperimmunized with 5 c.c. per pound of defibrinted virus blood plus an equal volume of distilled water with 0.4% sodium chloride added.

Hog 3568 was hyperimmunized with 5 c.c. per pound of undiluted, defibrinated virus blood.

Fourteen days after hyperimmunization, blood was drawn from each of the above hyperimmunes and serum prepared from each in the usual manner by defibrination of the blood and the addition of 0.5% phenol. The three lots of serum thus obtained were tested on susceptible pigs in doses of 5 c.c., 10 c.c., and 15 c.c., against 2 c.c. of virus blood. For the purpose of control, two pigs were injected with the virus blood alone. The results of these serum tests are shown in Table 10.

TABLE 10.

TESTS OF SERUMS FROM HOGS HYPERIMMUNIZED WITH VIRUS BLOOD DILUTED WITH WATER.

Serum Dose	Virus Dose	No. of Pigs Treated	Result.
Serum from Hog 3569, Hyperimmunized with Whole Virus Blood Diluted with Distilled Water.			
5 c.c.	2 c.c.	2	1 sick but recovered; other showed only slight loss of appetite.
10 c.c.	2 c.c.	2	Both showed only slight loss of appetite.
15 c.c.	2 c.c.	2	1 sick but recovered; other remained well.
Serum from Hog 3570, Hyperimmunized with Defibrinated Virus Blood Diluted with Distilled Water.			
5 c.c.	2 c.c.	2	Both died of hog cholera.
10 c.c.	2 c.c.	2	1 died of hog cholera; other sick but recovered.
15 c.c.	2 c.c.	2	Both slightly sick but recovered.
Serum from Hog 3568, Hyperimmunized with Undiluted, Defibrinated Blood.			
5 c.c.	2 c.c.	2	Both remained well.
10 c.c.	2 c.c.	2	do.
15 c.c.	2 c.c.	2	do.
Virus Controls.			
None	2 c.c.	1	Killed on 9th day when moribund; well-marked lesions of hog cholera.
None	2 c.c.	1	do.

It will be seen that the serum from hog 3568, hyperimmunized with the undiluted, defibrinated blood, possessed a high degree of potency, as all of the pigs receiving this serum were completely protected even by the smallest doses. On the other hand, the serums from hogs 3570 and 3569, hyperimmunized with the diluted, defibrinated blood and the diluted whole blood, were distinctly lower in potency (Table 10). As hog 3568 received twice as much actual virus blood as hogs 3570 and 3569, the results of the serum tests cannot be taken as an indication that dilution of the blood and hemolysis reduced the antigenic power of the virus, but, rather, that those changes in condition did not enhance the antigenic power sufficiently to compensate for the reduction in the total amount of virus injected.

The preceding experiments indicate that neither dilution nor hemolysis increases the antigenic properties of hog cholera virus blood to any material degree when injections are made intravenously.

SUMMARY.

The methods employed to hyperimmunize hogs against hog cholera are discussed and experimental evidence is presented to show that hogs which are hyperimmunized within a short interval after simultaneous immunization do not produce serum of satisfactory potency. It is also shown that as a rule ability of the hyperimmunized hog to yield a potent serum increases, within certain limits, as the interval between immunization and hyperimmunization increases. The simultaneous inoculation of nonimmune pigs with serum and virus was followed almost immediately by a remarkably firm immunity which enabled them to withstand enormous doses of virus blood administered intravenously within a day or two after simultaneous inoculation. Hyperimmunization with virus blood diluted wiht 0.5% citrate solution and with distilled water is described and experiments are presented which indicate that dilution and hemolysis do not materially increase the antigenic properties of the virus blood.

CONCLUSIONS.

1. In the production of anti-hog-cholera serum an interval of not less than seven weeks should be allowed to elapse between immunization and hyperimmunization. It is believed that the most uniformly satisfactory results will be obtained by allowing at least three months to elapse between immunization and hyperimmunization.

2. The ability of immune hogs to respond to hyperimmunization to the desired degree, once acquired, remains unimpaired for at least a year.

3. There is no evidence of a "negative phase" or state of hypersusceptibility to hog cholera folowing simultaneous inoculation.

4. Dilution and hemolysis of hog cholera virus blood do not materially increase its antigenic power.

Dr. L. F. Koonce of Raleigh, N. C., is recovering from an attack of "flu" contracted while attending a meat and milk inspectors' meeting in New York City recently.

THE CONTROL OF SOME OF THE IMPORTANT INFECTIOUS DISEASES IN THE CONSERVATION OF OUR LIVE STOCK.*

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At no time in the history of our country has the veterinary profession been confronted with more serious problems than at present. All conditions, especially those affecting the food supply, have changed since the outbreak of the present great world conflict, and since our participation in the war the conservation of the food supply became the keynote of the leaders.

For many years to come after the conclusion of peace the depletion of live stock in all countries in Europe will continue to make them dependent upon outside sources for their meat food. From the present outlook the United States and Argentine will be especially called upon to make up the deficiency created in European countries. The great demand for foreign shipment resulting in a marked increase in value of all live stock brought about a natural tendency among the breeders and stockmen to immediately realize the profits and disregard to some extent the future as far as the supply of live stock is concerned.

For this and many other reasons it is obvious that it is the duty of the veterinarians to enlighten stock owners of the necessity to maintain their breeding stock at a maximum and to conserve the health and quality of the animals. All means and precautions should be taken to guard against losses from diseases and the authorities should conscientiously enforce all measures by which it is possible to guard against the spread of disease.

In this regard the occurrence of sporadic diseases among the live stock is of minor importance when compared with those scourges which are responsible for the death of thousands—yes, hundreds of thousands—of animals.

There should be no slacking on the veterinarian's part and unless he realizes that it is his duty to assist with all his ability in the conservation of live stock he fails to do his bit.

In the different localities of our country various infectious and contagious diseases are prevalent. Some sections suffer year

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after year from losses from a certain disease which is unknown in other sections. This is primarily dependent on the geographic and climatic conditions, as well as on the adaptation of certain localities for the breeding of certain live stock. Among the diseases which are most widely spread throughout the United States and which on account of its insidious nature is the most difficult to control is tuberculosis. Unfortunately there has never been a definite plan formulated which would encourage an early control and eradication of this disease and in view of the character of the disease and complexity of the control of tuberculosis it would not be possible to discuss this affection within the scope of this short treatise. Furthermore, it would not be possible to take up many of the other diseases within the time allotted to me and it will be probably most advantageous to confine the discussion to some of the diseases which are especially prevalent in your locality and which might be responsible for great losses among the various species of animals.

ANTHRAX.

More recently anthrax has appeared in various parts of the country in which heretofore it was unknown. Several of the New England States have become new centers of the infection and in most instances the introduction of the disease was traced to tanneries which on account of the shortage of hides were compelled to import them from foreign countries.

Anthrax is known to be insidious in certain parts of the country in which the disease occurs annualy among the live stock. Such infected localities are known as anthrax districts, our Southern States being especially heavily contaminated. Besides the disease is also prevalent in some of the Northern and Western States, but the area there is more limited. In the Eastern part the origin of the disease may be in most cases traced to polluted streams from tanneries which, inundating the land, have deposited the virus of the disease on to the low lands. From here animals carry the disease to more distant parts of these localities and the infection becomes in some cases permanently established.

The tenacity of the anthrax spore which may persist in the soil for many years without suffering in its vitality renders the elimination of the infection from infected localities very difficult. Besides the infection may establish itself in suitable soil permanently in a way that the anthrax spores at proper temperature and moisture conditions will germinate and again reproduce

spores. Thus the propagation and reinfection of the soil may take place without a re-contamination of the soil from outside sources. Under such conditions one can readily see the difficult problem of eliminating the infection from the soil.

The persistent cultivation of the land, drainage of areas subject to inundation may reduce the infection in such localities. However, the danger of the reappearance of the disease must be always given due cognizance in view of the resistance of the anthrax spore.

In the control of this disease, as in all other infectious diseases, it is primarily essential to make an early, definite, positive diagnosis of the disease. The post-mortem characteristics which in some cases are definite may be far from pathognomonic in every instance. The clinical manifestations in the form of the tarry consistence of the blood, the enlarged spleen, gelatinous infiltration of the subcutis, the bloody discharges from the natural openings, etc., while in many cases present, are not manifested in every case. This applies especially to the peracute cases in which very few of the characteristic lesions are indicated.

During life, unless our suspicion is aroused to the presence of the disease from the history, the symptomatology of anthrax is not absolutely characteristic. Therefore, we are dependent to make the diagnosis positive, especially in more obscure cases, by subjecting the blood to miscroscopical examination and if necessary to test inoculations. As soon as the disease is being diagnosed the opening of the carcasses should not be undertaken since such procedure induces the formation of spores from the germs contained in the body of the carcasses, which naturally would bring about a permanent infection of the land.

It should be realized that spores do not form in the carcass of the animal unless it is opened and that the vegetative form of the organism is readily destroyed by the putrefaction of the carcass. In case the disease is suspected and a definite diagnosis cannot be established it is advisable to take a few drops of blood on to a piece of glass from a carcass as soon after death as possible, dry the same in the air and cover with another piece of glass. This should be properly wrapped and forwarded for diagnosing purposes. Such material affords sufficient quantity for microscopical examination and also if necessary for test inoculations. As soon as the diagnosis of anthrax has been made the veterinarian should look for the source of infection. The

animals should be kept from the source of infection, the carcasses should be burned and if such is impossible they should be buried at least seven feet deep and covered with quicklime. The premises should be thoroughly disinfected.

If the disease occurred in a dairy, quarantine measures should be instituted prohibiting the sale of milk for at least ten days from the occurrence of the last case. On premises where the disease has appeared, all animals, including horses and hogs, should be subjected to vaccination. The simultaneous method is best adapted in such instances, which consists of the injection of an anti-anthrax serum on one side of the animal and the spore vaccine on the other side. Temperature readings should be taken on all animals, and those showing rise of temperature over 103°, with the exception of hogs, should be given the serum alone. Those animals showing signs of the disease should be given curative doses of the serum which has proven to save a large proportion of animals.

In order to safeguard the stock in the infected locality and to prevent further outbreaks, it is further advisable to vaccinate the animals around the infected premises, and in such instances, also, either the simultaneous method or the double vaccination may be employed. Vaccination of the stock should be undertaken for several years, even if no further signs of the existence of the disease have occurred, since it is a well-known fact that the disease may again develop even after a period of several years, in which case a reinfection of the soil may result.

As far as the contamination of the streams from the tanneries is concerned, the Federal authorities are aiming to promulgate measures by which the importation of hides from anthrax carcasses might be prevented. Up to date, however, there are no satisfactory means by which this may be accomplished. Some of the more up-to-date tanneries, in order to prevent the contamination of the streams from the drainage water of the tanneries, instituted settling tanks in connection with the establishment, which, however, have not proved to entirely eliminate the infection, although by passing the drainage water through a series of settling tanks and then spreading the solid material over filter beds the infection may be reduced considerably. Chlorinating of the drainage water has also been attempted and proved highly satisfactory. Such practice, however, proved quite expensive and to my knowledge has not yet been inangurated in any of the tanneries.

Thus, as long as tanneries will handle hides from anthrax carcasses they will be a constant source of infecting the lands lying along the streams into which the drainage from the tanneries flows and the sanitary authorities must direct their attention principally to controlling the disease as soon as it makes its appearance.

BLACKLEG.

Another disease in which the infective agent is present in the soil and which is responsible for great losses among the cattle in our country is blackleg. Although not as contagious in its nature as anthrax, nevertheless in so-called blackleg territories losses from this disease amount to considerable among the young stock.

The causative agent which is ever present in the soil may enter the body in various ways. The infection probably occurs most frequently through ingestion, although abrasions in the skin may also afford an entry for the germs. More recently Dr. Hadwen, Chief Pathologist of the Branch of Animal Industry of the Dominion of Canada, discussed with the writer certain observations which he made in connection with his studies on the life history of the hypoderma larvæ during which he observed that during the burrowing process through the skin the larvæ may carry the blackleg infection.

Once the organism becomes localized it exerts its pathogenic action upon the tissues surrounding the place of invasion. Here under favorable conditions the blackleg organism will propagate, eliminating the toxins, which causes a degeneration of the muscles and through the destruction of the nitrogenous matter gases are formed. The toxins are absorbed by the body fluids, causing the systemic disturbance and finally death.

It must be recognized that blackleg is a toxemia and that the blackleg organisms do not invade the general circulation but remain localized during the life of the animal. At the point of localization the pathological process continues, causing the characteristic lesions of the disease in the form of the crepitating swelling, gangrenous in its character.

In this connection blackleg is very similar to gas gangrene, which caused so many deaths among the wounded soldiers. It is a well-known fact that the Bacillus welchii, the causative agent of gas gangrene, and which has been the destructive disease of the armies at war, resembles morphologically, biologically and in its cultural characteristics very closely the bacillus of blackleg.

In fact, differentiation at times can be only accomplished by the most painstaking biological tests.

Bull and Pritchett of the Rockefeller Institute for Medical Research in their study of gas gangrene have established that this organism produces under certain conditions a very powerful toxin which is actually responsible for the serious results of the disease and deaths. These facts have likewise been established by the writer in his connection with the study of blackleg. The same claims as made by Bull and Pritchett, that under suitable conditions cultures of gas bacilli produce true toxins to which their pathogenic effects may be ascribed, may also be applied to the cultures of blackleg bacilli. They further maintain that there are produced at least two distinct toxins, one of which is hemolytic, while the other causes local edema and necrosis and probably also a more general toxic action. This we find to be also the result of the blackleg toxins. The hemolytic action on the blood is best shown by intravenous injection of Berkefeld filtrates of cultures which contain the meat. On the other hand, the local destructive effects may be readily produced by subcutaneous or intramuscular injections of such filtrates, such lesions then resembling closely those which occur in the actual disease of affected animals.

They further claim that repeated injections of filtrates in pigeons and rabbits result in a true active immunity, and the blood of immunized rabbits neutralizes the toxic actions of the filtrate not only in the test tube but also in the living animal with respect to the locally injurious actions, as well as the destruction of blood corpuscles. They have also found that the blood of rabbits which have received three injections of toxic filtrate from a given culture is capable of neutralizing not only that particular filtrate but the filtrate from four other cultures as well. These findings coincide with the action of blackleg filtrate as far as it has been studied and that we possess in this product true immunizing toxins which are responsible for the principal pathogenic effects in blackleg infection, and again it is noted that in order to produce such toxins it is essential to add *meat to the media*, otherwise the production of these specific toxins is inhibited.

These experimental findings constitute the fundamental knowledge on which the control of blackleg by the specific toxins is being attempted.

Up to the present time the most common method of vaccination which has been employed not only in the United States but also in other countries where blackleg is prevalent consisted of the injection of attenuated virus prepared in either pellet or powder form. The number of annual vaccinations with this product amount to many millions, and while the reports prove conclusively of value to the product as an immunizing agent, nevertheless the results are not uniformly satisfactory, as direct losses from vaccination are known to occur from time to time; and, furthermore, insufficient protection following vaccination is also of too common occurrence.

The shortcomings of the blackleg vaccine lie mainly in the fact that in its production the virulence and immunity producing properties cannot be accurately enough controlled and tested. It is true that the vaccine is weighed or measured, but it is impossible to establish the amount and activity of the virus which it contains.

Due to the shortcomings of the different methods of vaccination, investigators have sought to develop a product which would possess the greatest possible immunizing properties and also be safe and controllable from the time of its production until the administration into the animal. Japanese investigators in continuing the work to develop a germ-free filtrate as inaugurated by Foth produced from mass cultures a safe and effective product for blackleg immunization and at the present time the germ-free filtrate is used almost uniformly for vaccination purposes against blackleg in Japan.

The results of vaccination of animals with Blackleg Filtrate has proven beyond a doubt the effectiveness of this method. Out of one million animals vaccinated by this method less than 1/25 of 1% died of blackleg, which must be considered a very small percentage, since the fact must be recognized that most of the deaths occurred shortly after vaccination, that is, before immunity was fully established, and besides vaccination in most instances was undertaken in herds where the disease had already made its appearance.

It is natural in the production of Blackleg Filtrate the greatest care must be exercised in order to insure a potent product, that is, the filtrate must contain the active toxins of the blackleg germ. The toxins when injected into the animal produce an active immunity which will afford a protection lasting for about one year. Blackleg Filtrate being germ-free may be injected

safely into calves at any age without the slightest danger. Animals over two years old are seldom affected, especially if they have been vaccinated in their younger age, as the immunity produced will protect them through the ages of lesser susceptibility. The highest degree of immunity is produced by vaccination of animals at ages between six months and two years.

Animals vaccinated should not be exposed to the infection until the immunity has been established, that is, for a period of ten days, since during that period they are still susceptible, even hypersusceptible, to the infection. Aside from vaccination, other measures of control must also be inaugurated, special attention to be given to the destruction of the carcasses in order to prevent the re-impregnation of the soil with the infection.

HEMORRHAGIC SEPTICEMIA.

Hemorrhagic Septicemia is a collective name for those infectious diseases of different species of animals which are caused by the *Bacillus bipolaris septicus*. Not only does the causative agent primarily attack the animal and cause outbreaks with great losses but the germ is frequently secondarily responsible for losses among live stock. The disease may occur as an independent infection in cattle, sheep and hogs, whereas the organisms have been found as secondary invaders in hog cholera, equine influenza (shipping fever) and in canine distemper. Recently McGown attributes a destructive disease of sheep in Great Britain known as Braxy to a variety of this organism.

Hemorrhagic Septicemia or bipolar organisms are very widely distributed in nature. They are found in the soil, on various plants, in stagnant water and even on the normal mucous membranes of animals. Under such conditions they apparently live as saprophytes and under favorable environment they become virulent, causing outbreaks of the disease, and later, after the infection has been overcome, they return to the harmless stage.

The disease running as a true septicemia, the symptoms and post-mortem lesions are characteristic of such an infection. It manifests itself either as an intestinal or pectoral form with a febrile condition and not infrequently the symptoms and even the anatomical changes resemble those of anthrax. On post-mortem a subcutaneous exudate is found, which is gelatinous in its character. The hemorrhages are present in the connective tissue on the serous membranes, in the abdominal and thoracic cavities, the heart, etc. The lymph glands are enlarged and are

injected with blood. In the pectoral form a characteristic thickening of the interlobular connective tissue is present which tends to make the lungs appear similar as in pleuropneumonia. In the intestinal form there is frequently a necrosis of the mucosa, resulting in hemorrhages into the lumen. There are great variations in the manifestations of both symptoms and lesions of this disease and a positive diagnosis is frequently difficult. The microscopical examination in some instances may reveal the causative agent in the blood or tissues, but this may also fail, and in such cases the only way to make a positive diagnosis is by test inoculations. The disease being fatal in its character, attention must be directed towards preventing and checking all outbreaks. For this purpose vaccination has been employed with uniformly good results.

The first time vaccination was resorted to in the United States was in an outbreak of Hemorrhagic Septicemia which occurred among the buffaloes in the Yellowstone Nationl Park. The method of preparation of the vaccine used in that instance has been described by Mohler and Eichhorn in an article on Vaccination against Hemorrhagic Septicemia in 1911. Since that time this method has been employed on hundreds of thousands of animals throughout the United States and the results justify the use of the vaccine for preventive purposes.

In a recent publication on Hemorrhagic Septicemia by the Bureau of Animal Industry it is stated that cattle, sheep, swine, rabbits and fowls if treated with heated cultures of hemorrhagic septicemia germs obtained from animals of the same species as that to which they themselves belong will almost invariably become protected against injections of living cultures of the same germ, even though applied in comparatively large quantities.

Furthermore, in connection with the control of hog cholera, veterinarians have found that frequently it is advisable to use Hemorrhagic Septicemia vaccine in conjunction with the serum simultaneous treatment of cholera, especially so in localities where they learned from experience that the serum simultaneous method failed to check the disease and that hogs continued to die with marked chronic symptoms and lesions of a lung infection with hemorrhagic septicemia. In such cases it is assumed that the serum simultaneous method will not prevent the development of the pathological process resulting from the secondary

infection with the hemorrhagic septicemia organism, which naturally accounts for the continuance of losses in such instances.

Outbreaks of hemorrhagic septicemia, especially in cattle and sheep, frequently result from stockyard or stock car infections. Thus, for instance, in the fall and winter of 1915 and 1916 numerous outbreaks were reported to the Bureau of Animal Industry in which young stock cattle that had been purchased in carload lots at some of the large stockyards had developed hemorrhagic septicemia even a few days after their arrival. At the same time two flocks of sheep and one of goats were found to be affected with the disease. Thus, in order to prevent the occurrence of outbreaks, it is apparent that thorough sanitation of the stockyards and the stock cars is essential. In actual outbreaks aside from the protective vaccination a thorough disinfection of the premises is also necessary.

HOG CHOLERA.

Of the diseases of hogs, hog cholera is no doubt by far the most important, causing tremendous losses throughout the United States and other countries. It is not necessary to enter into the discussion of the symptomatology and post-mortem appearances of hog cholera, since every veterinarian is thoroughly familiar with the characteristic manifestations. It is recognized that frequently the diagnosis is difficult even from post-mortem appearances, since the characteristic lesions are not fully developed in all cases. The disease is highly contagious in its character and may be spread in many different ways. No doubt the transportation of hogs is the most important factor in the spread of the disease. This feature has been recently ably discussed in an article by Dr. Luckey, State Veterinarian of Missouri, who considers that transportation of hogs is the most important factor for the existence and spread of hog cholera. Of course, other methods of dissemination should not be lost sight of, such as infection by polluted water, dogs, birds and man.

Fortunately, we are in a position to combat this disease by vaccination and the reduction of the number of cases of cholera in the past few years has conclusively proven that it is possible to prevent the outbreaks and reduce the losses from cholera markedly by the intelligent use of hog cholera treatment.

Hog cholera serum has been probably the most important biological product produced in recent years. Its effectiveness in hog cholera caused by the filterable virus is no longer questioned.

In this instance it is also essential to have a potent serum, and to adhere to the strictest precautions against contaminations, both in the handling and administration of the serum. In spite of the fact that the protective value of hog cholera serum has been established beyond a doubt, nevertheless numerous complaints are made which question the beneficial effects to be derived from immunization against hog cholera. Various factors are responsible for such failures. Among these, probably the most commonly recurrent one is a mistake in diagnosis. Practitioners are very prone to establish a diagnosis of hog cholera in case several animals die, without determining the character of the post-mortem lesions. An insufficient knowledge of other infectious diseases of swine may also be responsible to some extent for the failure in hog cholera vaccinations. A serum without the proper potency, or, on the other hand, in the simultaneous method, a potent virus, without the potent serum, may bring about bad results. It should be understood that hog cholera serum represents one of the crudest biological products which we have at our command for combating disease, since we have no means of properly standardizing it, and of establishing with any degree of certainty the amount of protective substances contained in the blood serum.

It must be acknowledged that the study of disease of swine has been somewhat neglected. Veterinarians are prone to accept any outbreak of infection as hog cholera, frequently relying for their diagnosis on lesions which are far from pathognomonic. The lesions which are commonly accepted as those of hog cholera may also be associated with other diseases. Thus, for instance, hemorrhages in the kidneys may appear in association with any septicemic condition, as is likewise the case with the cutaneous, subpleural and subperitoneal hemorrhages. An edematous, hemorrhagic condition of the lymph glands is also not infrequently found in the presence of the kidneys of swine. When appearing irregularly and infrequently it may arise from excessive acid or oily substances in the food, from injuries or from overheating. It is therefore apparent that in order to establish an accurate diagnosis of the "virus cholera" it is essential to take into consideration everything which is characteristic of the symptomatology and anatomical changes of the disease.

German investigators have recently devoted a great deal of attention to the study of disease of hogs, especially with reference to their relation to hog cholera. As a result of this work

it has been established and substantiated by such men as Pfeiler and Joest that there are a number of varieties of bacteria of the coli-typhus group which cause affections of hogs characterized by necrosis and ulceration of the large intestines. It is therefore suggested that such cases should be designated by the common name of "bacillary hog cholera" in contradistinction to the "virus cholera."

The bacillary type of cholera appears more or less in the form of a stable affection. Once established, it is very persistent, particularly because its character is not recognized. This no doubt accounts for the many reported failures from the use of hog cholera serum. It is true that the virus cholera is the most destructive disease of hogs, nevertheless the constant losses from other diseases must be significant and have to be taken into account. From time to time reports are published that serum has proved ineffective in a certain outbreak of disease among hogs; in some instances it is even stated that the blood from such affected animals proves non-virulent. These, I believe, are the cases which on careful study would prove to be due to other infections rather than the filterable virus.

The importance of losses from hog cholera is very evident, and since the protective vaccination has proved to be very effective in this disease, one can realize the advantages and the importance of employing this treatment; but only to those cases where the serum will exert its action upon the true etiological factor; otherwise the veterinarian will be called upon to explain the failure and of course he will be apt wrongly to blame it to impotent serum, which will bring this valuable product into disrepute.

Aside from tuberculosis and contagious abortion, the four diseases discussed are of the greatest economic importance. Their occurrence as enzoötics and epizoötics necessitates a constant vigilance for their suppression before the infections become extensively disseminated.

Veterinarians should coöperate with the sanitary authorities in their effort to suppress these dangerous diseases, as only by concerted action can we hope to attain the results which are essential at the present time to the welfare of our country.

Dr. W. B. Burris has resigned his position as meat inspector at the city abattoir, Baton Rouge, La., and has entered practice at Shreveport, La.

VETERINARY ETHICS.*

N. S. Mayo,
Chicago, Illinois.

"Once upon a time" (this is no fairy tale) while a student in college we took a course called Ethics or the Science of Duty. The moral seed, presumed to have been sown, evidently fell upon rocky soil, for the only thing that memory now recalls is the name. Later, as a veterinary student, we also received some good advice along this line. This is only mentioned to show I am not qualified as an expert upon this subject.

It may be worth while to refresh our memory by reading the code of ethics of the American Veterinary Medical Association.

Section 1. Members of this association are expected to conduct themselves at all times as professional gentlemen. Any flagrant violation of this principle shall be considered by this association as unprofessional conduct, and on written charges filed with the Executive Board, may subject the violator to suspension or expulsion, as provided in Article 5, Section 7, of the Constitution.

Section 2. No member shall assume a title to which he has not a just claim.

Section 3. No member shall endeavor to build up a practice by undercharging another practitioner.

Section 4. In all cases of consultation it shall be the duty of the veterinary surgeon in attendance upon the case to give the opinion of the consulting veterinary surgeon (whether favorable to his own or otherwise) to the owner of the patient in the presence of all three. In case of the absence of the owner the veterinary surgeon consulted may, after giving his opinion to the attending veterinary surgeon, transmit it in writing to the owner through the medical attendant. It shall be deemed a breach of this code for a consulting veterinary surgeon to revisit a patient without a special invitation by the attending veterinary surgeon or agreement with him.

Section 5. In advertising, the veterinary surgeon shall confine himself to his business address. Advertising specific medicines, specific plans of treatment, or advertising through the

* Read before the Michigan State Veterinary Medical Association.

medium of posters, illustrated stationery, newspaper puffs, etc., will not be countenanced by this association.

Section 6. Any person who shall advertise or otherwise offer to the public any medicine, the composition of which he refuses to disclose, or who proposes to cure disease by secret medicines, shall be deemed unworthy of membership in this association.

Section 7. It shall be deemed a violation of the code of ethics for any member of this association to contract with or through the officers of any live stock insurance company for the professional treatment of the members' stock so insured; but this rule shall not prevent any member from becoming an examiner of risks and acting in the capacity of an expert for the same.

Section 8. Each member shall observe the code of ethics adopted by this association and be answerable to the Executive Board for any breach of the same.

The principles of veterinary ethics are largely those that have been adapted from the human medical code. In human practice great emphasis is properly placed upon the relation between the physician and patient, an ethical relation that is of much less importance in veterinary practice. This phase of ethics is largely replaced in veterinary practice by the relation between the veterinarian and the owner of the animals. There is, however, an ethical relation between a veterinarian and his patient that should never be forgotten. The veterinarian should be as humane as possible. With modern anesthetics, both general and local, much pain can be prevented, and it is the duty of every veterinarian to alleviate the sufferings of his patient as much as possible.

Veterinary ethics may be considered under three heads:

1. The relation of the veterinarian to the owner of the animal.

2. The relation of the veterinarian to fellow practitioners.

3. The relation of the veterinarian to the public, and one might add the relation of the veterinarian to himself.

A veterinarian is or should be the expert adviser to his client, so far as the health of the client's animals is concerned, and to do this he must have his client's confidence. This confidence can be gained by strict integrity and "making good" in practice. A veterinarian should be frank and, above all, sincere in his relations with a client. There is nothing that destroys confidence so quickly as deception, even though such deception is practiced at the client's request and for his benefit. The basis

of all ethics, professional or other, is strict integrity. Mistakes may be forgiven, though they are often costly, but deception or trickery lives long in human memory. The relation of a veterinarian to his client is changing, particularly in country districts, toward preventive medicine. The stockman wants to know how to keep his flocks and herds free from disease, and the veterinarian must be able to advise him, as well as treat ailing animals. Such advice should be largely negative, that is, what the stockman should not do. The positive technical treatment must be given by a skilled veterinarian, and the veterinarian should educate his clients along this line.

Recently a professor in a veterinary college was required, against his judgment, to give a course of veterinary lectures to agricultural students. This course proved to be very popular, but it was a negative course—don't do this, don't do that—but call a qualified veterinarian.

The relation of a veterinarian to his client is so extensive that it cannot be covered in a paper of this kind. Success depends largely on the personality of those involved, as well as on the tact, skill and good judgment of the veterinarian. The general principles governing the relations between practitioners are well known, so I shall only consider some phases that appear to be overlooked or violated most frequently.

Criticisms of another veterinarian's work are a frequent cause of trouble. If a stock owner is dissatified with a veterinarian's services the stockman will usually present only his views that in most cases are not sufficient to base a professional opinion upon. A successful practice cannot be built upon criticism of your fellow practitioner. In most cases such criticism injures you more than it does your competitor. It does not make friends nor increase your efficiency. If some of your so-called friends are urging you on, remember it is only the innate human desire to be entertained by a scrap—it is not done to further your interests.

Another frequent violation of ethics is cutting prices to get business. Every time you cut prices you are injuring yourself more than your competitor. A professional man is often measured by his own estimation of his ability. No one knows better than yourself what your services are worth. Anyone can cut prices, but it is not an easy matter to restore them. It takes a good veterinarian to do first-class work, and he should receive corresponding remuneration. At the present time a veterinarian

should avoid cutting prices for the returns for his work have not increased proportionally to his expenses.

The relation of the veterinarian to the public is changing very rapidly at the present time. People are becoming educated as to the importance of preventing the spread of transmissible animal disease, and the practicing veterinarian has a public duty to perform along this line. He should take an active part in outlining preventive measures to protect the live stock industry. He should be an authority to whom farmers and stockmen look for guiding help. The veterinarian should, of course, work in harmony with state and federal veterinarians. The farm adviser, farmers institutes, granges and similar organizations offer excellent opportunities that should not be neglected. There is also the local paper and live stock journals that are always looking for "copy" on subjects that are of general interest to the community. And in rural communities live stock is very important. The underlying principle should be to make yourself a valuable asset to the community.

The foregoing brings up the question of advertising. In this the veterinary profession has also followed the medical profession, which does not approve paid advertising. I believe, however, that a neat professional card in local newspapers is ethical and helpful in various ways.

A veterinarian should also use neat printed stationery. Cuts of prancing stallions or even of yourself, while they may be artistic, are unethical and should not be used. There are some things not mentioned in the printed code of ethics that are equally important. A veterinarian is a professional man, and should fulfill professional requirements. A veterinarian whose hospital does not compare favorably with an ordinary livery stable is violating professional ethics. The public today understands the fundamentals of hygiene and sanitation, and the veterinarian by his personal appearance and surroundings should fulfill this requirement.

Not all the ethics of our profession can be expressed in the written code. Ethics is the science of duty. There are business ethics that must be fulfilled for violation of these seriously impairs one's professional standing. There is also one's duty to himself to maintain the high standards that govern professional men in all phases of human relationship. You represent the veterinary profession in your community, and the profession will

be judged very largely by you. In case of doubt, it is always safe to follow the golden rule or just put ourself in the other fellow's place, remembering that—

"The purest treasure mortal times afford
Is spotless reputation; that alway men are
but gilded loam or painted clay."

ABORTION AND STERILITY.*

E. T. HALLMAN,
East Lansing, Michigan.

The conception that most people have of abortion disease is that of a specific infection of the reproductive organs, characterized by premature expulsion of the fœtus. This phase of the problem I do not care to consider, except to show its relation to the problem of sterility.

Schroeder and Cotton, Wall and others have claimed that the abortion bacillus does not persist very long in the non-pregnant uterus, the latter apparently not being a favorable place for its propagation. If this is true the reason has not been given. However, the changes in the uterus resulting from pure abortion bacilli infection have enabled other pathogenic micro-organisms to establish themselves for varying lengths of time. It is these complicated infections that I wish to consider at this time. It is well known to most of you who have had any experience with abortion in cattle that failure to conceive sooner or later becomes an even more serious problem, both economically and from the standpoint of losing calves. The generally accepted opinion is that failure to breed under these conditions is a complication of the abortion infection, but due to other micro-organisms. Whether this is right or wrong is not definitely settled; but it is known that under these conditions sterility is a common condition and in most cases, whatever the cause, careful clinical examination will reveal pathological conditions apparently explaining failure to conceive.

It is not possible to consider in one short paper the various conditions causing sterility. It occurs to the writer that best use of the time can be made by confining his remarks to what has in his experience proven to be the most common condition

* Presented at meeting of Southeastern States Veterinary Medical Association, Birmingham, Alabama, February, 1919.

associated with sterility, viz., chronic catarrhal endometritis and cervicitis. Another reason for the writer taking this view of the problem is that chronic catarrhal conditions are the most difficult for most veterinarians to diagnose and treat. In the acute inflammatory conditions, the diagnosis is more easy and treatment consists largely of irrigation and drainage.

Etiologically, chronic catarrhal cervicitis and endometritis may be due to a variety of microörganisms. In the cases we have studied we have not been able to demonstrate the presence of the abortion bacillus, though they were from herds in which abortion has been a serious problem for several years. Staphylococci, streptococci and B. communior were the microörganisms usually found.

Usually the only symptom observed by the layman is failure to conceive after service. The animal may come in heat regularly, take the bull, but fails to conceive. Rectal examination reveals but little change, if any, from a normal condition. The uterine walls may be flaccid, but since there is considerable difference in the tone of normal uteri at different periods this is not of much value in diagnosis.

The best evidence of disease is obtained by vaginal examination. In order for one to recognize an abnormal condition he must be quite familiar with the normal condition. The condition of the cervix and character of the vaginal and cervical secretions in health depend upon whether the examination is made at the time of estrum or otherwise. In a state of health, except during estrum, the mucosa of the vagina and cervix is a light pink color and comparatively dry. The cervical canal is closed. During estrum, the cervical canal is partly dilated and the mucosa a deeper pink color. There is a considerable quantity of a thin, clear secretion in the cervical canal and vagina. Shortly after estrum disappears this may be streaked with blood. In chronic catarrhal conditions the secretions are increased in quantity and often show flakes and streaks of pus. Frequently there is an adhesive mucus that may be mistaken for the mucus of pregnancy. The mucus membranes are more congested and if the case is of long standing there may be hypertrophy of the folds around the external os and cervical canal.

In making vaginal examinations for purposes of diagnosis the hand and arm should be disinfected and then rinsed in clean water. Soap or the coal tar disinfectants on the hand so alter

the character of the secretions that their condition cannot be determined.

It is desired to consider the pathology of these conditions somewhat in detail, or at least what appears to the writer as the pathological condition from a study of several cases that came under his observation. I want to emphasize the importance of a knowledge of the pathology of the conditions under consideration because only by knowing this can a sound, rational treatment be outlined.

Pathologically, the changes consist of a mucoid degeneration of the superficial epithelium and more deeply seated lesions in the uterine mucosa. The superficial lesions (mucoid degeneration of the epithelium) are of importance in that they explain the altered secretions, thereby rendering clinical diagnosis possible. But they are not of the most importance from the standpoint of treatment. It is the more deeply seated lesions that are of the greatest importance to you in that they determine the character of the treatment to be given and at the same time explain the limitations of medicinal agents in the treatment of these conditions. Our investigations indicate that there are no extensive changes in the uterine mucosa indicating large numbers of highly virulent microörganisms, but that the deeply seated lesions of the mucosa consist of foci of fibrosis due to colonies of bacteria of low virulence. All grades of fibrosis may be seen, varying from small foci of granulation tissue to foci of scar tissue. Sometimes these areas are seen adjacent to the smaller uterine blood vessels, and sometimes adjacent to or surrounding the uterine glands, and sometimes independent of the glands and blood vessels. Their effect on the uterine glands is apparent. It is the old story of granulation tissue contracting to form scar tissue. If a gland is involved the resulting scar tissue interferes, no doubt, with the nutrition of the gland and atrophy is the result. We have slides showing all stages of this periglandular fibrosis from the early stages in which may be seen leucocytes in the gland lumina, disintegration of the glanular epithelium, and immediately outside of the gland a zone of granulation tissue, to the later stages, where there is atrophy of the glandular epithelium and cicatricial tissue surrounding the gland. These areas of fibrosis are not large, averaging in our cases about two hundred and fifty microns but found to be well scattered throughout the uterine mucosa. The lesions are apparently the result of multiple foci of infection and clearly show the insidious and

progressive nature of the condition. The condition suggests not a diffuse inflammatory reaction due to large numbers of micro-organisms of a highly virulent type but to multiple foci of infection in the deeper layers of the mucosa, probably occurring over a varying period of time and due to microörganisms of low virulence.

I do not want to leave the impression that the changes in the uterine mucosa are very marked. A clear understanding of this is very important in that it indicates what may be expected from treatment. While there was some fibrosis of the uterine mucosa and atrophy of some of the uterine glands in each case studied, the changes were such that they could not be detected clinically nor by macroscopical examination of the uteri after they were removed from the carcass. It is of interest to note here that each case studied was a persistent non-breeder. A clinical diagnosis of chronic catarrhal cervicitis or endometritis and treatment had been given by the writer. The animals were finally sold for beef for failure to breed, though I might add that the conditions under which the animals were treated were such as not to encourage hopes of recovery.

In these cases it seems that the changes were not such as to render the animals permanently sterile. The number of glands showing atrophy were comparatively few and the amount of uterine mucosa involved in fibrosis was comparatively small. It appeared that there remained quite sufficient normal mucosa to meet the demands of a functioning uterus. The question arises, what was the cause of sterility in these cases? It seems that the answer is this: sterility was due to an active condition or process, and not due to structural changes. To repeat an often-quoted phrase, "It was functional and not organic." This latter is not wholly true, but probably the answer lies partly in both; slight organic changes giving rise to functional disturbances. It seems to me that in order to get this conception it is only necessary to consider the complex function that the reproductive organs perform.

It is a law of nature that the more highly specialized a cell or organ is, the more seriously it is disturbed by any abnormal influence. An irritant which may only cause certain lowly specialized parts to grow may cause more highly specialized parts to degenerate and die.

So it seems to me that sterility in many cases is explained by

functional disturbances and not by any extensive changes in the uterine mucosa.

TREATMENT.

If I have succeeded in conveying to your minds the apparent nature of the trouble, the limitations of medicinal agents are apparent. Our conception of this problem is that infection in these cases (and there is no doubt about infection being the primary cause) does not mean the presence of pathogenic micro-organisms in the uterine cavity, but means a condition, a process, due to the establishment and growth of pathogenic micro-organisms in the uterine mucosa. If you have this conception of the condition you can easily understand why the administration of medicinal agents into the uterine cavity, to the exclusion of other factors, is not going to have much effect on the condition. The usual use of medicinal agents in these cases never reach the source of the trouble in that their action is superficial and the cause is more deeply seated. It seems that recovery can only occur in case the defensive and reparative mechanism of the uterus is increased, so that the infection can be destroyed and the damage repaired. It appears that destruction of the micro-organisms must be accomplished by the defensive mechanism of the uterus itself and not through the application of medicinal agents into the uterine cavity, which, to reach the infection, would have to penetrate the superficial layers of the uterine mucosa. How best to strengthen and aid the defensive mechanism of the uterus in these cases is the problem before us. I have no solution. Perhaps if we can increase the circulation through the parts by massage and other means, thereby increasing the number of phagocytes, the amount of bactericidal substances, and nutrition of the uterine mucosa, some aid may be given.

Uterine curettage has been used in woman. It is not conceivable that any large proportion of the microörganisms could be removed in this way and if any good comes from this practice it is more likely that it is the result of mechanical irritation and stimulation, rather than from actual removal of the micro-organisms. Curettage of the bovine uterus is hardly possible. At this time I am using injections of iodine into the uterus and swabbing the cervix with iodine in conjunction with uterine and ovarian massage. First, the cervical canal is cleaned with a physiological salt solution or a two or three per cent sodium borate solution. This is easily accomplished by connecting a female

metal urinary (mare) catheter with a pump or fountain syringe and inserting the fenestrated end of the catheter into the cervical canal. By constantly changing its position while the solution is flowing the secretion can be removed. If it is desired to irrigate the uterus the solution may be forced into the uterine cavity until there is a moderate tension in the uterus (governed by the hand in the rectum) and then the catheter disconnected and the solution forced out by uterine massage per rectum. It is questionable whether uterine irrigations are indicated except in cases where there is an appreciable quantity of an inflammatory exudate in the uterine cavity.

If there is hypertrophy of the folds of the cervical mucosa the hypertrophied parts are removed surgically. From one to two ounces of a fifty per cent Lugol's Solution of Iodine is then introduced into the uterus and the uterus massaged in order to force it into both horns. The cervical canal is swabbed with a pledget of cotton held in a pair of uterine dressing forceps and dipped in undiluted Lugol's Solution. This is repeated at weekly or ten-day intervals if indicated. It is not believed that the injections of strong solutions of iodine actually reach and destroy the microörganisms, but it is hoped that irritation and stimulation of the uterine mucosa will react favorably upon its defensive mechanism. This idea may be erroneous, but, anyway, the treatment of chronic catarrhal cervicitis and endometritis is still in the experimental stage.

LIVE STOCK EVOLUTION IN PROGRESS.*

J. R. MOHLER,
Chief, Bureau of Animal Industry,
Department of Agriculture.

A meeting of this kind is always a happy occasion. I am glad to see that there is little formality. That is one reason I enjoy attending a meeting of live stock raisers. Sometimes I have the feeling that the live stock industry has become important because of the frankness and the clear vision of the people it attracts as much as through its own intrinsic merits. I say that in all candor. Everyone who studies live stock learns a great deal about other things as well, including much useful knowledge about people. The trained eye of the live stock inspector and of

* Address before Southern Cattlemen's Association, New Orleans, La.

the stockman sees things as they actually are and places an accurate valuation on them. He readily sees through the shell of formality and distinguishes things that are genuine from those that are not. So I am not only glad to be here, but I ask you to take my remarks informally.

As most of you know, the Bureau of Animal Industry is well scattered over the country. It is principally a field organization. My desk happens to be in Washington and I spend most of my time there, but less than 8 per cent of the entire Bureau staff is in Washington. That means that more than 92 per cent of the Bureau's members are distributed over the country, more particularly in States where live stock raising is already prominent or is developing. I mention this so that you will know if our point of view fails to have proper breadth the fault is personal rather than that of the Bureau's organization.

SOUTH IS RIPE FOR RAPID CHANGES.

It has occurred to me that you would be interested in a few thoughts about the live stock changes that our own generation is witnessing. When we think of evolution, the mind generally goes back over the pages of history, or even to the period before history was written. We think of it as work which nature performed, especially with reference to the descent of man. Also, it is difficult to think of evolution in a new country like the United States. Yet this nation already has played a great part in the development of new animal life and the Southern States especially are ripe for many changes.

More than that, these changes—and they are changes for the good—can be hastened by the skill of man. Those who are here today can play an important part in this work. That may seem to some of you—and it does to me—a great responsibility. It *is* a great responsibility, but we have come over a long, long trail of experience.

LIVE STOCK CHANGES WITHIN THREE CENTURIES.

Thanks to our increasing knowledge of heredity, we can direct evolution of domestic animals almost at will in a general direction. To get a prospective of our present position, let us go back about 300 years, to the time of the Pilgrim Fathers. The meat sources of America at that time were wild animals entirely. There was no domestic live stock worth mention. Today the domestic animals of the United States number more than two hundred

and seventeen million, or twice as many as the number of people. The beginning of live stock breeding in the United States was slow, of course. Most of it has occurred in the last 100 years. Yet the average increase in horses, mules, cattle, sheep, and swine for the last three centuries in this country has been about 700,000 animal each year.

Within the last century the buffalo has become practically extinct and other wild animals have dwindled in numbers. Domestic meat animals have replaced wild game as a food for mankind almost entirely. Three hundred years is scarcely nine generations, a remarkably short time for such large-scale evolution of animal life. Now, what is an application of these facts? How can we use them? Their principal value is to give us the confidence of experience. More useful facts, however, are those of comparatively recent date. In fact, they have not reached the public to any extent. The Bureau lately has been studying live stock trends in other countries as well as in the United States, and some of the apparent developments are most interesting. Without going into detail let me give you the general facts regarding cattle and dairy cows, in which the South will soon be taking more interest than today. The conditions I am about to describe cover the period from 1850 to the present year.

FEED LIMITS NUMBER OF CATTLE IN WESTERN EUROPE.

Generally speaking, the number of cattle in the older countries has increased but slightly during that 68-year period. This is true of such countries as Norway, Sweden, Denmark, Holland, France and Germany. For the most part there has been a greater increase in the number of cows kept for milk than in the total number of cattle, an observation indicating one of two things. Either the milk cow is gradually replacing the beef animal or else the census takers and statisticians have used greater care in distinguishing between dairy cows and cattle. But in general there has been only a small increase in the number of cattle in Western Europe during the period from 1850 to 1918, inclusive, due probably to dependence on imported feed. Yet, even with the war as a disturbing factor, the output of dairy products increased considerably during the period. Denmark, for instance, has improved her cattle until the average cow now yields somewhat more than six thousand pounds of milk annually, compared with about four thousand pounds in the United States. For con-

venience, I am speaking in round numbers. So it appears that even after a fairly definite maximum is reached in the number of cattle kept, dairy production may still increase through skillful breeding. Observations in the less densely settled countries are quite different. In Australia, Argentina, Uruguay, Canada, and the United States there has been a rapid rise in the number of cattle kept both for milk and beef during the same years, 1850 to 1918. The increase still continues and from European experience we have every reason to look for greater meat and greater dairy production in these newer countries.

REFRIGERATION STIMULATES INTERNATIONAL MEAT TRADE.

It is important also to remember that modern methods of refrigeration and canning have transformed the long-distance trade in meat and dairy products. Shipping live animals for slaughter was never very satisfactory. The animals and the necessary feed required too much shipping space, but meat frozen by artificial methods is a compact commodity and may be shipped safely to any market in the world. The lesson from abroad, therefore, seems to be this: If the United States is safely to retain the agricultural leadership established by the war, we must improve both the quality and the quantity of live stock. We must improve the quality especially and do it on a sound basis of economics. Perhaps we can not compete with Argentina and Australia in supplying cheap beef to Europe, but we should at least be able to feed our own population.

You may ask why that is necessary. There are many reasons, of which I need mention only a few. Failure to mantain our live stock in proportion to our population means dependence on other countries. It means dependence on them for meat, for leather, and for animal fats. It means dependence on them also for fertilizers with which to maintain crop yields in the absence of manure. It may even mean dependence on them for milk with which to feed our children, as Europe lately has been depending on the United States for milk in condensed or powdered form. In other words, if we fail to feed ourselves or to satisfy our home market, someone else will, and in fact is already doing so.

DEVELOPMENT IN SOUTH AMERICA.

Imports of meats and meat products by the United States in 1918 exceeded one hundred million pounds. These were received

principally from Argentina and Canada. A report lately received from the American Consul General at Buenos Aires contains some public remarks made by the manager of an Argentine packing establishment and they are remarks which are very illuminating. Among other comments, he stated that "large quantities of canned meats are now regularly shipped to the United States, the great cattle country of former years." Also "that the United States can no longer be regarded as a meat exporting nation."

Incidentally, the South American slaughtering and meat packing establishments are employing about thirty thousand workers, and in 1917 that country exported more than half a million tons of frozen and chilled meats, estimated to be about 55 per cent of the total exports of this commodity from all countries. Yet the first ship to carry meat chilled by artificial refrigeration was in the spring of 1879, scarcely 40 years ago. So you can see that important changes involving the meat industry are going on constantly and that South America is preparing to feed nations that fail to provide meat for themselves. Now, how can Argentina, for example, produce meat cheaply enough to compete with the home-grown meat products of other countries? The consular report mentioned answers that question very definitely. "There has developed," it states, "the systematic improvement of herds by the infusion of the best stock blood of the world, which has resulted in types of cattle even superior to the imported strains."

"The extensive growing of alfalfa, which insures an abundance of the best pasturage for cattle feeding, has made it possible to support and fatten one animal per hectare (2½ acres) where two hectares (5 acres) of unimproved land were needed to support one animal which had later to be fattened on improved land."

Moreover, the cattle are in the open throughout the year. Those conditions are strikingly similar to conditions here in the southern part of the United States and I want to call your attention especially to the importance of better types of live stock. The proper type of pure-bred animal—whether cattle, hogs, sheep or poultry—makes its gains vastly more economically than scrub stock. The same is true of dairy production. Lately I was interested in reading a report from Dallas County, Texas, which stated that the feeding cost per gallon of milk was 39 cents for scrub cows, whereas in a dairy having pure-bred Holsteins it was only

16 cents. Some of you may be more familiar with the details of that report than I am, but the condition is a typical one.

THE TIME ELEMENT AS AN IMPORTANT FACTOR.

The splendid progress you have made in tick eradication is gratifying. In comparison with periods commonly considered in connection with evolution, the work began late. The eradication of the Texas fever tick started, as you know, less than 13 years ago, yet nearly two-thirds of the area is now clean. How long is it going to take you to make the cattle tick an extinct creature in the United States?

Hog cholera eradication along systematic lines began even later, in 1913, seven years after the campaign against the tick. The progress there also is encouraging. Last year about five and a half million hogs were vaccinated and the death rate from cholera was the lowest on record, less than 4 per cent. The number of hogs dying from hog cholera in 1918 was about 60 per cent less than the year when the work began. So it looks as though hog cholera can be suppressed entirely within a few years provided the work is pressed with vigor, as I am sure it will be.

Systematic eradication of tuberculosis by the accredited-herd plan began still later, only about a year ago. About 300 herds are now fully accredited—a rather small figure, to be sure—but still a healthy beginning. You can take that remark in two ways.

With these three scourges at last out of the way, or reduced to impotency, and the lesser ailments cut down in proportion, the United States should be a live stock region where animal improvement should continue with accelerated progress. Already we are blessed with freedom from certain scourges of the old world and the southern hemisphere. Veterinarians are familiar with those scourges, at least by reputation, but I doubt whether even the names of many of the foreign contagions are familiar to some who are here. There is rinderpest, surra, pleuro-pneumonia and Malta fever. There is also foot-and-mouth disease which, as an occasional visitor to the United States, is more familiar.

THE IMPORTANCE OF QUARANTINE SERVICE.

The inspection and quarantine service of the Bureau keeps all those destructive animal plagues at bay. In fact, the Bureau of Animal Industry was established by Congress in 1884 to erad-

icate pleuro-pneumonia. This was accomplished in several years and no case has occurred since 1892. Thus, we have been free from it for a quarter of a century. In brief, the United States has less than half as many serious animal scourges as exist in the world, largely because this country has had a good start in disease control and is following it up. That phase of the work, however, has been the prevention of loss; an equally important task is the upbuilding of what we may call our live stock assets.

You are all familiar with the principle known as the survival of the fittest. Without going into the details of evolution, let me say that scrub live stock is no longer fit for perpetuation in the United States. A scrub is wasteful of feed, and wasteful of its owner's labor. The scrub animal has served its purpose as a connecting link between the old obsolete method of farming and the new progressive methods. Thousands of farmers in this country already have discarded scrub stock and are better off because of that decision. Pure breds are worth more to keep and are worth more to sell. The scrub animal has been useful as a connecting link, but our aim from now on should be to make the scrub extinct and to make it the missing link of the future so far as live stock is concerned. That cannot be done immediately, but it is the goal toward which we should work.

USEFUL FACTS ABOUT HEREDITY.

The Bureau lately has been conducting some experiments in the study of heredity, and you may be interested in some of the results already evident. These results are noteworthy, not so much as furnishing new discoveries about animal breeding but by establishing a sounder basis for the principles of heredity which are already accepted. Here are some outstanding points.

"The heritage transmitted by an animal can not be altered by any system of feeding, or training, or by accident." A bull, for instance, may be expected to produce just as good calves before or after he is in the best show condition as when actually in that condition.

A law of heredity which every one should remember and should impress on all live stock owners is this: "The person who simply by careful management tries to produce continuous improvement in a scrub herd is doomed to disappointment." Still another important breeding law is the following: "Selection based on progeny is more effective than selection based on individual merit." That emphasizes the importance of knowing the family

history of breeding stock and studying the production records instead of relying too much on the appearance of the individual animal. When a person buys a pure-bred animal he is really buying more than an individual; he is obtaining the heredity traits of its ancestors as well.

I need not remind you that pure-bred stock is harder to buy and easier to sell than any other kind. That is why the Bureau is encouraging community breeding associations, pig clubs, cow-testing associations, bull associations, and similar activites. Such organizations focus attention on the value of better live stock and eventually become sources of pure-bred animals of merit. Compared with the status of community live stock work a few years ago, the present progress seems encouraging, but on closer scrutiny of the field we see that improvement of live stock is really just beginning. For instance, cow-testing associations in the United States numbered about 357 last year, composed of dairymen owning approximately 172,000 cows. That seems a considerable number, but it is scarcely three-fourths of 1 per cent of the dairy cows in the United States.

Probably not many of you have heard of the employee in the patent office who about fifty years ago resigned during a temporary lull in the work. His reason was based on the fear that everything which could be invented had been invented and he desired to change his employment before the patent office was discontinued. And that was before the invention of the telephone, the automobile, phonograph, airplane, submarine, wireless —you can complete the list for yourself. In fact, since the time that employee of short vision resigned, the really marvelous inventions of all centuries have taken place.

So in dealing with live stock, let us realize that the best years are coming; also that we are making progress not with machinery which has no power to perpetuate itself, but, rather, with living creatures, and that every accomplishment is multiplied by succeeding generations. From the account of the cow-testing work you will see that even with our present knowledge of heredity and what is happening in the live stock industry throughout the world, we are just beginning scientific development in animal improvement. It would go on faster, I am sure, if there were more meetings like this where we could exchange ideas and information. The press, the various extension agencies, and other organizations, however, have been of untold service in carrying agri-

cultural information into the homes of live stock owners on whom the actual rate of progress finally depends.

The main thoughts I want to leave with you are these: Animal evolution is constantly going on. You are working here in the South where the field for improvement is ripe. If you are just beginning, begin right. If you have started wrong, get right as soon as you can. This means the wise choice of breeding animals and following out a consistent plan. The kind of live stock which the South is to have eventually is merely the sum total of what each farmer chooses. You can help to make the unprofitable scrub cow extinct. The method is obvious; just stop breeding that kind. You can continue the extermination of the principal animal diseases, and once they are stamped out, the quarantine services of the Bureau and the various States will see that they do not get back.

SHORT COURSE FOR SOLDIERS AND SAILORS.

The Massachusetts Agricultural College has just announced its policy to repeat as often as may be necessary the special six weeks short course in agriculture and horticulture for returning soldiers and sailors. Such a course was given at the college during February and March of this year. The success of the first course and the number of inquiries received from men in service in the United States and France has induced the college to make this provision for men who wish a short period of practical instruction as a preparation for farming.

It is expected to make special provision during the summer term, beginning June 30, for instruction of soldiers, and if there is sufficient demand for it to give a special six weeks short course soon after college opens next fall.

Representatives of the private veterinary schools held a meeting in Chicago May 12 to consider entrance requirements. There were present representatives from the Grand Rapids Veterinary College, the Indiana Veterinary College, the St. Joseph Veterinary College, the McKillip Veterinary College, and the Chicago Veterinary College. It was unanimously agreed by these representatives to adopt the requirements of the Bureau of Animal Industry, which demand two years' high school preparation for the session of 1919-20. This preparation to be certified to by the State Department of Education.

CLINICAL AND CASE REPORTS.

MAN DIES FROM ARSENICAL POISONING BY ABSORPTION.

E. I. Smith,
Inspector in Charge, B. A. I., Baton Rouge, Louisiana.

A local cattle inspector (layman) while engaged in the work of tick eradication in Louisiana spilled some of the concentrated arsenical preparation on his shoulder while engaged in charging a vat for the morning dipping. He did not take time to wash off the solution, but, on the other hand, proceeded to supervise the dipping of about 150 head of cattle. Suddenly he became sick and two physicians were called, who, after closely observing the symptoms and noting the history of the case, pronounced it arsenical poisoning. In spite of skillful medical attendance the patient died six hours after the accident.

The writer has been actively engaged in the work of tick eradication since 1909 and cannot recall a similar fatality in man as a result of handling the concentrated dip or in preparing the crude chemicals. Heretofore, in a few instances, inspectors have been slightly nauseated from breathing the steam in the preparation of the boiled dip containing arsenic, but not of a serious nature. The concentrated solution in this case required that ten gallons of it be diluted with 1,500 gallons of water, to yield a quantitative test of 19 one hundredths of one per cent of arsenic, which in the end is harmful only to ticks and other parasites of a similar nature.

SCLERODERMA IN HOGS.

I. E. Newsom,
Colorado Experiment Station.

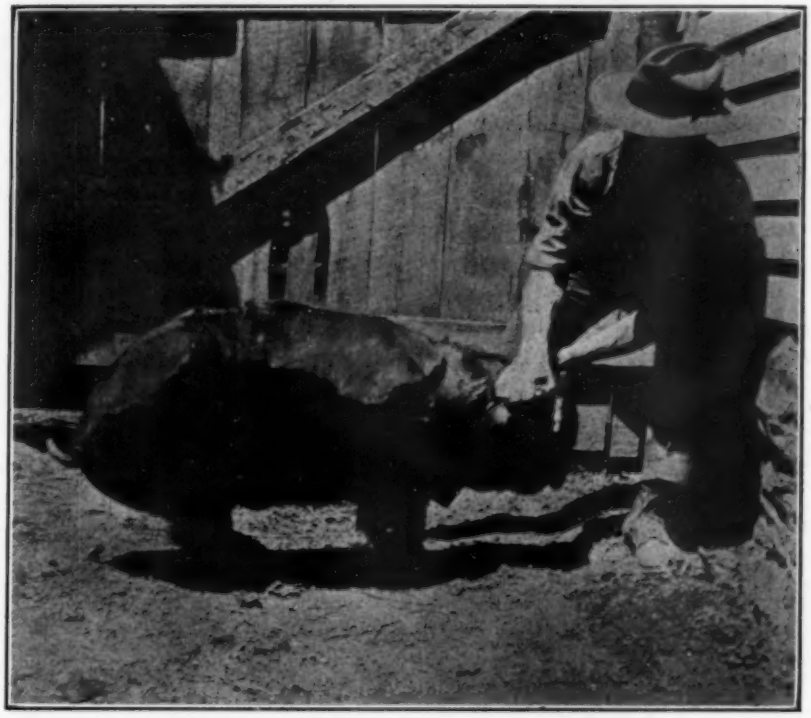
In May, 1918, there was received at the veterinary hospital of the Colorado Agricultural College the pig whose picture accompanies this article, with the history that two more were affected in the same way. These hogs had been on a ranch near Cheyenne Wells, Colorado, for several months previously and

were running with a large herd. The owner informed us that he had never imported hogs from foreign countries.

It appears that the disease was first manifested by a hardening of the skin over the shoulders and a rigidity of the tips of the ears. This hardening continued down the ear until it had invaded the larger part of these organs, also over the back and part way down the sides of the animal. The process was very slow-going and took probably three months to complete. At the end of this time there began a separation, noticed at the edges, and finally the whole scale, in some places two inches thick, sloughed off, leaving a bare, raw surface, but with practically no hemorrhage. Most of this time the hog appeared to be doing fairly well, but there would be days when he would refuse food. Finally, some two or three weeks after the slough had taken place, he refused food entirely for several days and was found dead one morning.

Unfortunately, we did not work during this time to determine the cause of the disease and present it here merely because

it seems to us peculiar. Hutyra and Marek have described the condition under the name we give above, but do not assign any cause for it. That three animals in the same herd should be affected and then there should be no further spread seems to us



a little unusual. Before the slough took place the hog had the appearance of the one pictured by Hutyra and Marek under "Swine Erysipelas." There is, however, little reason to believe that it was this disease.

TUBERCULAR ENCEPHALITIS AND CEREBRO-SPINAL MENINGITIS.

S. A. GOLDBERG, Department of Pathology, and W. D. WAY, Department of Medicine, New York State Veterinary College, Cornell University, Ithaca, New York.

A two-year-old black and white pure-bred Holstein heifer has been suffering from digestive disturbances for several days, has progressively become emaciated and recently weakness of the legs has been observed. The heifer came from a herd in which

a large number were tubercular. This animal was tuberculin tested sixteen months previously with apparently negative resuts.

Recently the heifer has been treated for sterility, a corpus luteum being squeezed from the left ovary on two different occasions.

On examination, the heifer was down, lying on the sternum. Efforts to rise resulted in failure to accomplish more than a mere floundering around. Considerable depression was evident. Condition was poor, hair coat roughened. Eye was dull. There was no evidence of fever. Extremities were cold.

Appetite was very poor. A pail of cold water was given the heifer, which seemed to cause distress, expression of pain, trembling over the whole abdominal region, and the heifer looked around at the abdomen anxiously. There was very little peristalsis on auscultation, contractions of the rumen were very weak, and the abdomen was very small. Rectal examination revealed nothing but severe pain and straining. Feces were scanty and harder than normal.

There was marked increase in sensitiveness over the whole abdominal region and along the back. This, together with the paralysis, led to the provisional diagnosis of meningo-myelitis. Peritonitis was also suspected on account of the hypersensitiveness of the abdomen. Tuberculosis was also considered on account of the herd history.

On a second visit, two days later, hyperesthesia appeared more marked and there was apparently no improvement resulting from the administration of stimulants of aromatic spirits of ammonia and nux vomica.

Four days later a third call was made, and the heifer was found prostrated on the left side, head, neck, and all four feet stretched out. There was apparently complete paralysis, as any attempts to raise the head were fruitless. Heifer was lying perfectly quiet for a few minutes and then went into a spasm of kicking with all four feet. This lasted but a short time and she became quiet again until another attack.

Animal was in a dying condition and immediate slaughter was advised and resorted to. Killed by bleeding. Autopsy immediately after.

AUTOPSY PROTOCOL.

External examination showed decubital sores on the limbs and around the tuberosity of the ilium. The animal was in poor condition.

Internal examination showed that the appearance of the peritoneum and the arrangement of the organs were normal.

In the spleen there were numerous petechiæ and reddened fibrous tufts on the capsule. On section the spleen appeared normal.

The kidneys were lighter in color than normal. On section, they bulged, the cortices were lighter than normal, while the medullæ were hyperæmic. The capsules peeled easily.

The liver was lighter in color than normal. On section, it bulged, and the parenchyma was of a hazy appearance.

The bladder was greatly distended by about two liters clear urine. Otherwise it was normal.

The ovaries showed slight fibrosis. Otherwise the genital organs were normal.

Two of the mesenteric lymph glands were slightly enlarged and contained caseous and calcified nodules 5 mm. in diameter. The remaining abdominal lymph glands were normal.

In the thoracic cavity there were numerous adhesions 1 - 4 cm. in diameter between the parietal and the visceral pleura. These adhesions were between the diaphragm, as well as between the costal pleura and the visceral pleura. They were composed of yellowish caseous and calcified material and a considerable amount of connective tissue.

In the left lung there were solidified areas 3 - 8 cm. in diameter in the cardiac lobe. On section, these areas were composed of caseous and creamy pus, in which there was a considerable amount of calcification. The rest of the lung was nearly normal. There were areas of emphysema in the right lung, otherwise it was normal.

One of the posterior mediastinal lymph glands was 20 cm. long, 10 cm. wide and 8 cm. thick. On section, there was yellowish creamy pus in the center, caseous material containing calcified areas at the periphery, and around this mass there was a considerable amount of connective tissue. The rest of the mediastinal, as well as the bronchial lymph glands, were enlarged by caseous nodules varying from 5 mm. to 1 cm. in diameter. The

superficial lymph glands and those about the head were apparently normal.

The heart and pericardium were normal.

In the brain, the meninges as well as the brain tissue were markedly congested. On opening the olfactory lobes a large amount of yellowish, slightly turbid liquid escaped. The lateral

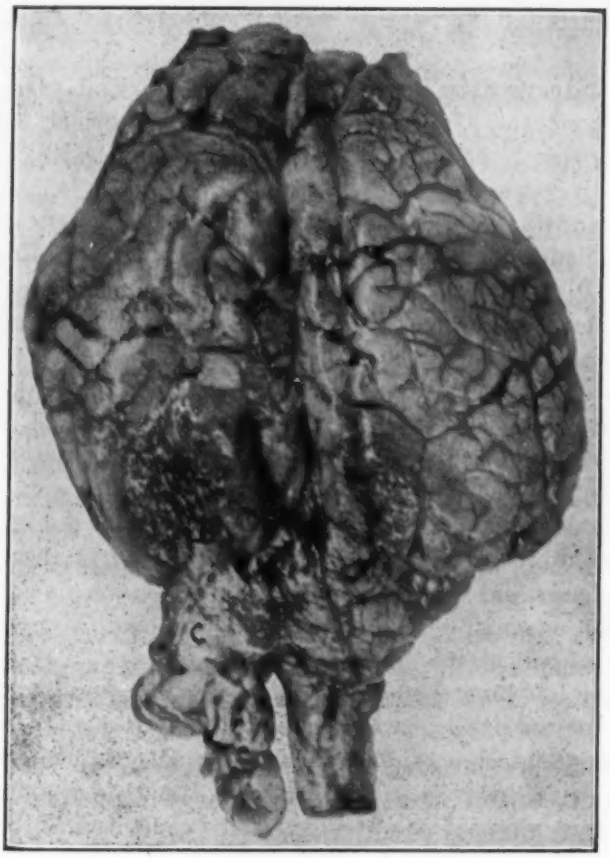


FIG. 1

ventricles were greatly distended by yellowish liquid. The vessels of the floor of the lateral ventricles as well as the choroid plexuses were greatly congested. In the posterior part of the cerebrum the meninges were adherent to each hemisphere by dense connective tissue, for an area of about 2 cm. in diameter. Under the meninges in these areas the cerebral tissue was of a yellowish brown color and denser than the surrounding tissue. These

areas were more or less circumscribed. The area in the right hemisphere was 2 cm. in diameter, in the left hemisphere 3 cm. in diameter. On section, these areas were of a yellowish brown color containing fine calcified granules. The right one extended into the cerebrum for an area of 2 cm. into the brain tissue. The cerebral meninges around these areas were covered by a diffuse yellowish connective tissue growth in which there were whitish connective nodules about 1 mm. in diameter.

FIG. 2

The spinal meninges were covered by a diffuse yellowish connective tissue growth about 2 mm. thick throughout the length of the cord. There were also scattered whitish connective tissue nodules 2 mm. in diameter. The spinal fluid was greatly increased and of a yellowish color. A larva of *Hypoderma bovis* was found under the meninges in the lumbar region.

Microscopically, the yellowish brown areas in the cerebrum were composed of very small nodules. The centers of these nodules were necrotic. The necrotic areas were surrounded by zones containing epithelioid cells and numerous giant cells. Around these zones there were lymphocytes and connective tissue. The meninges were thickened by embryonal as well as by adult connective tissue cells with numerous various sized blood vessels. Scattered in this proliferating tissue were numerous various sized giant cells and lymphocytes. There was also an increased amount of mesothelium. There was no necrosis in the thickened meninges. The spinal cord itself was apparently normal.

Sections of the lesions in both the cerebrum as well as of the meninges showed the presence of individual rod-shaped acid-fast bacteria.

DIAGNOSIS.

Immediate Cause of Death.—Bleeding.

Fatal Illness.—Tubercular encephalitis and cerebro-spinal meningitis (chronic caseous encephalitis and chronic productive cerebro-spinal meningitis).

Primary Lesions.—Apparently tubercular lymphadenitis and pneumonia.

Secondary Lesions.—Acute parenchymatous nephritis and hepatitis.

Parasites.—*Hypoderma bovis* larva in the spinal meninges.

DESCRIPTION OF PLATE.

Fig. 1.

A. Tubercular lesion right cerebral hemisphere.
B. Tubercular lesion left cerebral hemisphere.
C. Adherent cerebral meninges.

Fig. 2.

A. Tubercular lesion right cerebral hemisphere on section.
B. Tubercular lesion left cerebral hemisphere on section.
C. Adherent cerebral meninges.
D. Enlarged right lateral ventricle.

Dr. George H. Berns of Brooklyn, who graduated from his Alma Mater in 1879 and who has reached the three score and ten period of his life, retains splendid vigor and a deep interest in all matters veterinary. For the past two years he has returned to teaching clinical surgery in his Alma Mater in New York City.

NOTES ON OBSTETRICS.

JAMES A. WAUGH,
Pittsburgh, Pennsylvania.

A graduate of several years' general practice called me in consultation on a bad case.

Patient.—Grade Percheron mare heavy in foal and in bad condition, blind and suffering from chronic fistula of the withers; slight pus discharge and much fibrous thickening or hypertrophy of tissues; aged about 11 years and fairly well nourished.

History.—Neighbors stated they observed indications of labor pains and parturition in this mare in the pasture field as they were going to church Sunday morning; but owner did not observe the case till Monday, and then realized a veterinarian's services were required. Fœtus lying on its back and front feet presenting; then ropes were applied and limbs drawn out to carpus, and veterinarian amputated them, but could not deliver, and then called the writer in. We applied ropes on lower forearm above amputations; skinned upwards and applied traction and delivered the balance of the limb, including scapula; then applied similar methods to other limb. Found lateral deviation of head, folded backwards on bent neck after much searching; I got my hand on angle of lower jaw and brought it up and forwards so that the other veterinarian got his middle finger in corner of mouth and introduced a hook into the mouth and drew the head and neck into line; then we looped a rope around lower jaw, stuck iron hook into orbital socket; applied traction of four men, and were compelled to use compound wire fence block and tackle to effect delivery. Had the mare a while in swinging stocks but removed her for final delivery with tackle. Gave stimulants and put her in a box stall at 10 p. m., and she lived two days. This was no single veterinarian's case.

CASE NUMBER 2.

Subject.—Grade Holstein cow with second calf, undersized, and bred to a very large bull.

Condition.—Hind feet presenting and lying on its back; delivery delayed and impeded by disproportion in size of fœtus and dam. Applied ropes to the limbs and directed the dairyman and his sons to pull and they soon pulled the cow out of her stall. Then we reversed her with tail to manger, and they pulled away

faithfully for over one hour, and finally delivered a live calf, and it and mother did satisfactorily. We were all agreeably surprised as we expected a dead calf and possibly a dead cow later.

CASE NUMBER 3.

An old Toronto graduate with twenty-two years' experience called me in consultation about a case that he had failed with two days testing his ability.

Subject.—Boston terrier bitch mated with a fox terrier dog; pups dead and emitting a bad odor. Gave mild creolin-pearson in warm water douche; examined and had the other veterinarian clamp his hands around the patient's chest and hold her on her feet. I applied forceps and delivered three pups and douched with a warm water permanganate of potash solution and completed the case in twenty minutes' time. The veterinarian stated over the phone that he had the case two days and failed and I could do no better, only satisfy the woman owner; and I jocularly said, "Wait till you see me operate, then you will say I am the smartest man that ever listened to old Andy Smith." In fact, I went out to win this time, and I enjoyed the fun.

CASE NUMBER 4.

I have had four cases of eversion of vagina in large bitches during the past year, all being exposed for some time, and were swollen and in bad condition. Decided to stitch and amputate after cleaning up with mild astringent and antiseptic lotion; and all made rapid and satisfactory recoveries. It is necessary to remove the sutures in six or eight weeks, as they will cause an irritation and vaginal discharge which alarms the owners.

REMARKS.

I believe our veterinary colleges are not yet able to afford sufficient clinical material to give the necessary instruction in practical obstetrics, and the average graduates are compelled to learn the practical working problems after leaving college, which requires much careful clinical experience and some consultations; and every veterinarian should have good friends in his profession and a well-stocked reference library. Remember what Hoskins tells us about conserving the live stock interests and animal wealth of our country. Government reports state there are two hundred million dollars' worth of live stock dying in this country of preventable diseases every year. That should convince us

there is room for us and many other new veterinarians in this country. Perhaps we have been too cosmopolitan coming from many diverse colleges, large and small; long and short terms, and from various states and countries, but the recent ruling of the Surgeon-General's office, U. S. A., and the recommendations of the B. A. I. and Civil Service Commission, will compel us to conform towards definite and established conditions in our profession.

NEVADA ACT PROVIDES FOR RECIPROCITY.

The Nevada State Legislature at the 1919 session passed an act regulating the practice of veterinary medicine, surgery and dentistry.

The act provides for registration of existing practitioners of four years' standing without examination and future registration of graduates eligible to take the examination for appointment as veterinary inspector in the Bureau of Animal Industry after passing a satisfactory examination by the State Board, and also reciprocity with other states having an equal standard.

The act is to be administered by a State Board of Veterinary Medical Examiners consisting of three members appointed by the Governor for a term of three years, one to be appointed each year. Governor Boyle has appointed the first board as follows: Dr. Robert Dill, Reno; Dr. George L. Nichols, Yerington, and Dr. F. H. Baker, Gardnerville.

The board meets for organization at Carson City the first Monday in May, 1919, and the law becomes effective July 1, 1919.

SOME PRACTITIONER.

Sam Brown with an overseas cap and two bars on his arm was back in town.

"Hello, Sam, haven't seen you for a long time. Where have you been?" asked an old acquaintance.

"Ah's been ovah in France wid da United States Vetahnahy Fo'ces."

"Veterinary? I guess you mean veterans, don't you, Sam?"

"No, Ah reckons Ah means just what Ah says—vetahnahy. Ah jest naturally been a vtahnahy—feedin' them German dogs gunpowder for they distemper."—Ex.

ABSTRACTS.

LINGUAL CANCER.

In his Bradshaw lecture on Cancer of the Tongue, Mr. D'Arcy Power referred to the fact that it is almost entirely a human disease; it is always of one type; it is unknown in children; it is common in men, rare in women, and is not associated wth any inherited predisposition to carcinoma. He gave an interesting description of the disease from the historical standpoint, pointing out that it did not become important surgically until the seventeenth century, the Greek, Latin, and Arabian writers on surgery hardly mentioning it, and so far as can be ascertained at present it is unknown to the Anglo-Saxons.

"The first definite notice of cancer of the tongue is the case of Ralph Freeman, who died on March 16, 1634, whilst serving the office of Lord Mayor of London. He suffered from secondary hemorrhage, and it was the opinion of the physicians and surgeons who were in attendance upon him that a mercurial course might have been of use at an earlier period of the disease. The second recorded case occurred in Germany, and was looked upon as a miraculous punishment for cursing the clergy. The story runs that 'lately a certain baron spoke abusively to all and sundry but kept his most venomous shafts for the clergy and for those who devoted themselves to God's service. One day a holy brother of good repute whom he had just lashed said, "Your foul tongue has overlong deserved that punishment from an offended God which it will shortly receive." The baron rode off undismayed, but a few days later a small swelling began to grow at the side of his tongue. Little by little it increased in size until it became an inoperable cancer, and the baron, penitent and confessed, died miserably afflicted.' From the middle of the seventeenth century onwards cancer of the tongue became so frequent that it was no longer necessary to invoke a miracle for its production. At the present time cancer of the tongue is known to have occurred in one horse, three cats, and one dog. All these animals were aged, and in each the cancer was of the squamous-celled variety. It appears fair to assume, therefore, that lingual carcinoma has always occurred in men and domesticated animals; that originally in man it was no more frequent than it is now in animals;

but that from the seventeenth century onwards it has increased out of all proportion in man, whilst the incidence has remained stationary in animals."—*Lancet* (Lond.).

EPITHELIOMA OF THE PENIS IN A PONY.

Captain J. F. D. Tutt, M. R. C. V. S., F. R. M. S., Winchester.

The subject was an aged pony, used for occasional short journeys into town.

History.—The owner came to me on September 3, 1915, and requested me to see the animal, as it had great difficulty in urinating, and the sheath was very much swollen. It was also rapidly losing condition. As it was an old favorite he desired to have it remedied if possible.

On arrival at the stable, I examined the sheath, and endeavored to withdraw the penis, but was unable to do so on account of the swelling. I was able to feel that the tip of the penis was rough, and that a growth was present, and I accordingly advised surgical measures.

An operation was carried out on September 7. The animal was cast and anæsthetised, and when well under the influence of the anæsthetic, the penis was withdrawn, but only with the greatest difficulty, and when secured with a piece of tape, was found to be covered with cauliflower-like excrescences on the end, and for a length of five inches was greatly enlarged and hardened.

The urethral opening was practically obliterated, and it was impossible to insert a catheter, even when the canal was slit open for a length of 3—4 inches. The healthy portion of the penis was secured by a piece of tape, the ends of which were held by an assistant.

The diseased portion was then carefully removed, and the slit portions of the urethra were sutured to the end of the stump in such a manner as to diminish the risk of stricture.

The patient made a good recovery and was able to urinate quite freely until its recent destruction on account of age, etc.

Prior to the operation just described, a previous operator had removed some papillomata (according to the owner) some two years before.

Microscopical Examination of Growth.—A paraffin section was obtained in the usual way, cut and suitably stained.

The penis was found to be infiltrated by an extensive malignant growth, having the structure of a squamous epithelioma. It was composed of ingrowing epithelial columns with cell nests and keratinoid changes—exactly like the same growth in man.—*Vet. Rec.*

PRIMARY NOCARDIASIS OF THE LACHRYMAL GLAND.

J. B. Christopherson, M. A., M. D. Cantab., F. R. C. P. Lond., F. R. C. S., Eng., and R. G. Archibald, M. B., Ch. B. Edin.

The following is a note of a case of primary nocardiasis of the lacrymal gland, caused by a species of nocardia hitherto undescribed. The lacrymal gland appears to be one of the most remarkable glands in the body. Having a few disorders of its own, it fulfills its destiny undisturbed by the disorders of the outside world, content to be left alone to administer its secretion to the great master-tissue, the eye. The disease here recorded represents nocardiasis or actinomycosis, in which the causal agent is a germ or fungus, which grows readily ærobically and produces arthrospores.

The patient, a male aged 22, was admitted to hospital suffering from a swelling of the right eye, and inability to open it. The duration of the case was three and a half years. There was neither scar nor wound visible. The eyelids could not be everted, but when raised a thick yellow discharge poured out, and the whole conjunctival surface of the upper lid appeared to be rough and granular, with deep ulceration in parts. The swelling was painless, and was of doughy consistency, though without œdema. There was a bulging forwards of the fornix of the conjunctiva. No lymphatic glands were enlarged, and the sight was unaffected. The eyeball itself was not invaded, nor were its movements involved, neither was photophobia or lachrymation present.

Under chloroform, the growth was dissected away; it appeared to have commenced in the lachrymal gland, and to have spread into the upper lid, invading the tarsal cartilage. It extended also somewhat between the eyeball and the bony orbit, along the ducts of the lachrymal gland.

Sections showed the morbid histology commonly associated with a fungal infection. A portion of a grain flattened between a slide and cover-glass showed that it was composed of the typical

nocardial bacilliform hyphæ, with rounded bodies or spores, the whole being held together in a dense matrix. The reactions in various culture-media were investigated. The animal experimentation has not been concluded, but the condition does not seem to be pathogenic to the grey monkey.—*Lancet* (Lond.).

THE ETIOLOGY AND PATHOGENY OF RACHITISM.

De Biagi Fernando contributed an interesting article upon this subject to the *Revista Medica* for 1917. There is a theory that rachitism depends upon a disturbance in the function of the glands of internal secretion, and especially of the thymus, supra-renal capsules, and thyroid glands. So far back as 1858, Fredebleu sought to establish a connection between the function of the thymus and the development of the osseous system; but it may be said that the true origin of the thymic theory of rachitism is due to Basch. He observed that in rabbits and dogs, four or five weeks after the ablation of the thymus there were alterations in the general development, and in the case of fracture of bone disturbances in the formation of the callus. From this he concluded that the thymus gland throws into the circulation a substance which may exercise an important function during the period of growth. But the administration of fresh calf thymus to rachitic patients gave no results to Stolzner and to Lissauer; and later experiences demonstrate that, though disturbances of the thymus may have influence upon the general growth and upon the calcification, we cannot certainly find any co-relation between these disturbances and rachitism.

At a later date, importance was attached to insufficiency of the supra-renal capsules, the office of which seemed to be to regulate organic changes and the metabolism of the various tissues and animal organs.

Stolzner was the first to treat rachitism with extracts of supra-renal capsules, and obtained satisfactory results. He observed improvement of the craniotabes, eruption of the teeth, and subsequent diminution of the fontanelle, of the thoracic deformities, and of the alterations of the epiphyses.

Prof. Bossi, of Genoa, having in repeated experiments upon sheep constantly observed that the ablation of one supra-renal capsule provoked a true osteo-porosis, treated several cases of osteo-malacia with extract of supra-renal gland, and obtained

not only improvement, but true clinical recovery. These results suggested the use of supra-renal extract to avoid osseous deformities, especially of the pelvis, which are observed in infancy from rachitism; and this treatment was observed to give favorable results. Other workers afterwards took it up with success. Jovane and Pace, in Naples, and Mauro Greco, in Jemma, came to the conclusion that supra-renal treatment improved the nutrition of rachitic patients, stopped the osseous pains and the gastro-enteric disturbances, caused the disappearance of the softening of the tissues, and favored walking. Luzzatti, in Concetti, also administered tabloids of supra-renal extract, and was satisfied with the result.

According to another theory, rachitism depends upon insufficiency of the thyroid gland. The substance elaborated by this gland may have a stimulant action upon growth in general, and particularly upon the growth of the bones. In congenital myxœdema, there is an arrest in the development of these, and ossification remains stationary. Hofmeister has demonstrated that the same thing also occurs in young animals in consequence of extirpation of the thyroids. Quite the contrary occurs in hyperthyroidism, where the growth of the skeleton is accelerated. On the other hand, Hertoghe reports good results from the thyroid treatment of rachitism. But other observations have proved that this treatment is of use only when the rachitism is associated with hypo-thyroidism; in these cases the general nutrition improves and growth recommences.

Others have suspected a relation between the pituitary gland and rachitism. The physiological importance of the pituitary gland has been much studied, first by physiologists, then by clinicians. Extirpation of the pituitary gland, especially in young animals, causes arrest of development and disturbances of dentition, the osseous system, and metabolism. It appears that the action of pituitary extract consists in improving the utilization of the mineral salts which reënforce the organism, and in diminishing their elimination. Pituitary extract may stimulate these processes in rachitic patients, granting that hypo-function of the pituitary gland exists in them.

All the organs of internal secretion represent so many forces linked together in a long and intricate chain which governs the formative and protective rhythm of the organism. Thus it may be believed that rachitism has a polyglandular pathogeny.—(La Clinica Veterinaria.) W. R. C. *Vet. Rec.*

CONJUNCTIVITIS AND COLLYRIA.

G. MAYALL, M. R. C. V. S., Bolton.

Conjunctivitis of the catarrhal form is very common in dogs. It seems to be more frequent amongst them when they live in damp industrial regions than when they pass their lives in the purer air of country districts. In towns we seem to notice its greater frequency in dogs of small stature, such as Scottish terriers, Yorkshire terriers, bull dogs, fox terriers, etc., than in bigger dogs (i. e., dogs whose eyes are situated at a higher level from the ground), such as greyhounds, St. Bernards, mastiffs, retrievers, etc. The instances of bronchitis and catarrh in dogs, too, seem to be more frequent in the smaller breeds of dogs than in the larger ones. It has often seemed to us that one strong reason for this is the exposure of the eyes to a greater amount of bad vapors and contaminated air at a low level from the ground. The currents of cold air are stronger and keener close to the ground, the lower air strata are more heavily charged with dust, sand and irritant gases than those higher up and both lungs and eyes in small-statured dogs are in a more favorable position to receive the fullest dose of any injurious influences, so they become most frequently affected.

Apart from catarrhal conditions of the conjunctiva associated with distemper, eczema of the eyelids, mange, etc., we get many cases of what appear to be uncomplicated and simple catarrhal conjunctivitis. Frequently these subjects recover after a varying period, but now and then we get some frightfully obstinate cases to deal with. Fortunately, the majority of dog clients are of the class that used to keep carriage horses in days gone by, or of the better middle class, and as a rule they are reasonable, can afford to pay, do not expect lightning results, but are willing to leave dogs with us until cure or marked benefit results. The slowness of progress of a case, however, frequently dissatisfies the veterinary surgeon. One day he comes round his dog cases and finds a patient with a clearish eye and conjunctiva and the next it is filled with catarrhal discharge as profuse as when the original treatment of the dog began. The keeping of the dog's abode clean and free from draught has been strictly observed, but the disease still varies in its exacerbations and tests all the skill and knowledge of the veterinarian to defeat it. We have kept note of some half-dozen cases we have recently

treated, and think the periods of time occupied in cure and a statement of the collyria used may be interesting. The worst case as regards trouble and duration of treatment was in a Scottish terrier. Here the period taken up in treatment was eight weeks and the collyria used were boric acid, grs. xx, zinc sulph. gr. I, water an ounce, and later on peroxide of hydrogen solution and 5 per cent protargol solution. The lotions were applied by means of a syringe two or three times daily. A bull dog and a Pekinese took three weeks to cure with lotions of boric acid and zinc sulph. and adrenalin and alum lotion (5 grs. to the ounce of water) and protargol solution respectively.

A second Scottish terrier in a bad way from conjunctivitis, mange and oral sepsis was cured by means of scaling the teeth, cleaning the mouth with powdered charcoal, the administration of Parrish's chemical food and treatment of the conjunctivitis with 1 in 5,000 increased in strength to 1 in 4,000 corrosive sublimate solution applied warm twice daily. The conjunctivitis here was cured in ten days, and although very formidable at first the result was gratifying. A fifth dog, an Airedale, operated on under quinine and urea hydrochloride injections and chloroform anæsthesia for a large post-pharyngeal abscess was also suffering badly from catarrhal conjunctivitis which was cured in a week with corrosive sublimate collyria. A word of caution must be given in the use of this collyrium; if much of it moistens the eyelids externally it seems to denude them of hair, and it is wise to smear vaseline on the lids externally to protect them from the action of the lotion.

A sixth dog, a black Spaniel, took well over three weeks to set right with boric lotion and argyrol.

The results of these few cases seem to show that the quickest and most satisfactory results can be secured with corrosive sublimate lotion and we intend in future to use them largely. Where there are corneal ulcers or opacities they seem to have a beneficial effect on these complications.—*Vet. Jour.*

Dr. Thomas B. Rogers of Woodbury, New Jersey, has been a practitioner in southwestern New Jersey for forty years. He graduated at the American Veterinary College with the class of 1879. Though closely approaching the three score and ten, he has all the vigor and interest of a man of fifty. A year ago he returned to his Alma Mater as professor of veterinary therapeutics.

POLO TEAM OF VETERINARY TRAINING SCHOOL, CAMP LEE, VA.

Believed to Be the First Polo Team Ever Organized in the United States Composed Entirely of Veterinarians.

From left to right: Lieut. Col. Griffin, instructor; Captain Smith; Captain Muldoon, captain of the team; Captain Haring, Captain Hardenbergh, Captain Mackie.

ARMY VETERINARY SERVICE.

THE CAMP LEE POLO TEAM.

Owing to an unfortunate omission, the personnel of the polo team appeared incorrectly in the May issue of the Journal. We are, therefore, reproducing the illustration with the names of the members of the team correctly stated, and Captain Muldoon mentioned in his proper place as captain of the team.

FROM THE OFFICE OF THE SURGEON-GENERAL OF THE ARMY, WASHINGTON, D. C.

VETERINARY TRAINING SCHOOLS.

The Veterinary Corps organized three training schools for its personnel during this war—one for enlisted men at the Medical Officers' Training Camp, Fort Riley, Kansas; one for officers at Camp Greenleaf, Ga., where enlisted men were also trained, and one for organizing, equipping and training of veterinary units for overseas service at Camp Lee, Va.

The school at Fort Riley, Kansas, was established February 4, 1918, by Major Robert J. Foster, V. C. At that time authority had been given to allow men to enlist in the Veterinary Corps who were under and over the draft age. Practically all men who enlisted west of the Mississippi River were sent to Fort Riley for training. This school was in operation from February until September, 1918, and 540 men were trained, most of whom were sent to Camp Lee for overseas service.

The school at Camp Greenleaf was established by Major D. S. White (later Colonel), and it was contemplated to train there both officers and enlisted men. Major W. J. Stokes, V. C., assumed command of this school in March. At the time the armistice was signed, about 200 enlisted men had been trained; approxiately 490 officers had been graduated; 240 officers were in training, and 655 enlisted Medical Reserve Corps men (graduate veterinarians) had reported for duty, of whom 86 had been commissioned and the rest were candidates for commissions.

The training school at Camp Lee, Va., was organized in April, 1918, with the purpose in view of organizing, equipping and training oversea units.

Everyone must bear in mind the fact that the Veterinary Corps as a military organization was entirely new and was developed during the stress of war days, when haste meant everything. Everybody had to go forward, not backward, and if mistakes were made, there was no time to stop, but to move on with definite objects in view.

From the beginning of the Camp Lee school it was called upon to exceed its estimated capacity to send units overseas. The object of this school, as has been stated, was to organize, equip and train veterinary units for overseas service. At the time the armistice was signed, there was a schedule prepared for the shipment of overseas units to include June 30, 1919.

The Veterinary Corps had to provide officers for these units and had to have a constant supply to officer the units to be organized as fast as men were supplied from the draft. There was not an abundance of veterinary officers to fill this want. It was also found necessary to send officers overseas with either hospital or replacement units only.

The demand made for veterinary units by the War Department was of course known to the Veterinary Division, Surgeon General's Office, and on this plan the organization of units was worked out. To some officers it might have seemed a waste of time to be kept at Camp Lee and not be sent overseas immediately, but the pleasure of a few individuals could not be considered when it involved schedules affecting thousands of men.

It must also be kept in mind that the Veterinary Corps prior to the war consisted of less than 75 officers who had seen service of line organizations. Then, these officers had never had any regular military training. It was only what each individual had picked up for himself that marked his ability in purely military affairs. Many of these officers had been sent overseas and were not available for assignment to this school. When the establishment of the school was authorized by the General Staff, it was decided that it would be necessary to send line officers to the school as instructors until such time as the Veterinary Corps could supply the necessary trained officers. There was no other alternative.

Lieutenant Colonel Gerald E. Griffin, V. C., was probably the most experienced man in the regular army veterinary corps, and he was made senior instructor, with the idea of his eventually being made Commandant. Veterinary officers were placed as understudies to other line officers on duty, and, had the school not

been broken up by the armistice, all line officers would undoubtedly have been relieved shortly and their places taken by the veterinary officers acting as understudies.

The Camp Lee Veterinary Training School was in active operation from April 12, 1918, to November 11, 1918, and during that time a total of 393 officers and 7,968 enlisted men passed through the school. There were organized, equipped, trained and sent to France 15 veterinary hospitals (Nos. 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21), each consisting of 7 veterinary officers and 300 enlisted men; 1 base veterinary hospital of 4 officers and 144 enlisted men; 6 Corps Mobile Veterinary Hospitals of 2 officers and 35 enlisted men each; 3 Army Mobile Veterinary Hospitals of 4 officers and 144 men each, and 4 Veterinary Replacement Units of 13 officers and 200 men each.

There were organized, equipped and trained ready for oversea service, when the signing of the armistice caused all shipments to stop, 3 veterinary hospitals, 1 base veterinary hospital, 1 corps mobile veterinary hospital, with personnel similar to units above mentioned, and 1 veterinary replacement unit, consisting of 40 officers and 200 men. There was also in process of organization at this time, but not completed, 5 veterinary hospitals, 5 corps mobile veterinary hospitals and 2 veterinary replacement units. Starting with absolutely nothing—not even a building—this record is not to be despised, even though a few individuals were not pleased. There was time only, under this extreme emergency, to consider units, organizations and results obtained as a whole and not by individuals.

It would be an unpardonable mistake were the Veterinary Corps not to profit by the experience gained in these schools. It is believed that the Corps will be able to use to the utmost advantage the experience gained in conducting these schools in any system of instruction that may be established in the future.

It may be of interest here to outline the plan for schools proposed in the reorganization of the Army Veterinary Service.

Candidates entering the Army Service hereafter will be given a year's training before being assigned to duty with troops. After passing the prescribed physical and professional examination, they will be commissioned as 1st lieutenants, Veterinary Reserve Corps. The training will be divided into a post-graduate theoretical course at the Veterinary Department, Army Medical School, Washington, D. C., followed by a practical course at a

veterinary training center, yet to be decided upon. Each course will be from five to six months in length.

The theoretical course at the Army Medical School is planned to provide instruction in veterinary bacteriology and pathology; diagnostic and biologic laboratory methods; meat and milk hygiene; military veterinary medicine, with special attention to communicable and parasitic diseases; military veterinary hygiene, and regional surgery. Research work in animal diseases will also be undertaken here, where the opportunities for laboratory work will be unexcelled.

Officers who successfully complete the theoretical course at the Army Medical School will immediately be assigned to the practical veterinary training school to complete their training.

The practical veterinary training center will have to be conducted at a post or camp where a very large mounted command is located and a general veterinary hospital can be maintained to provide enough clinical material for teaching purposes. Here, it is also contemplated to teach enlisted men in the special branches needed for the veterinary service.

For officers, the practical training will consist of instruction in veterinary hospital administration, equipment and duties (including veterinary evacuation companies and veterinary evacuation hospital); surgical and medical clinics; communicable diseases—handling of, diagnosis of, etc.; horseshoeing instruction (practical and lectures); equitation; equipment of military animals (cavalry, field artillery, draft and pack animals, including instruction in packing); conformation; examination for soundness and horse-judging; breeding; military animal management; manual of small arms (pistol); map-reading, and such military training as is necessary.

It must be understood that the courses of training proposed are contingent upon enactment of legislation and reorganization of the veterinary service by Congress as a part of the Army reorganization contemplated. These plans are all in the hands of the General Staff.

The old Veterinary Corps, as it existed at the beginning of the war, consisted of 2 officers for each horsed regiment and 17 officers as inspectors of animals and meats. This limited and inflexible personnel is entirely inadequate. The Corps is now greatly expanded and is functioning along broad general lines, similar to the other closely-related professional branches of the

Medical Department and in general is organized similar to the veterinary services of foreign armies.

The main advantages of the Veterinary Corps of the Army, as now organized, are: 1st—It provides the Army for the first time in its history with a modern, scientific service. 2nd—By demanding the highest professional qualifications of the men entering it and offering adequate inducements in promotion, responsibility commensurate with grade, opportunity for research and original investigation, etc., it will quietly but persistently encourage a raising of the standard of the profession of the entire country. The second reason above stated is a paramount one why every member of the civilian profession, who has the real interests of his science and its advancement at heart, should be a staunch supporter of the Army Veterinary Corps. The Corps can only be as strong as the men who enter it from civil life can make it. There is no reason why it should not present an attractive career to the very best type of young professional men, but the desirable degree of excellence can only be developed by the personnel with the loyal assistance of the great mass of civilians.

Once the Veterinary Corps is soundly established by legislative enactment—a result devoutly hoped for in the near future—the system of instruction as described above can go forward and develop along the general lines laid down for it.

VETERINARY CORPS COMMENDED BY GENERAL PERSHING.

The Commander in Chief, American Expeditionary Forces, France, has recently commended the veterinary service through the Chief Veterinarian, Office of the Chief Surgeon, A. E. F., and expressed his appreciation as follows:

"Now that active operations have ceased, it gives me a great deal of pleasure to express my thanks, in the name of the American Expeditionary Forces, to the officers and men of the Veterinary Corps, for their efforts and accomplishments during the war.

Starting as you did, with insufficient personnel, and laboring under severe handicaps, you nevertheless have overcome many obstacles and achieved results.

The care of our animals was one of the most important duties in the American Expeditionary Forces. It required skill, foresight, patience and perseverance. You and your predecessors had

successfully created an organization for care and supply of animals that is a credit to our Army.

It is indeed praiseworthy that the efforts of all did not cease at caring for and fulfilling demands for animals. Your zeal happily led you into research work and as a result, you have made many valuable discoveries concerning the nature of and cures for equine diseases. That by itself will be a lasting monument commemorating your unselfish and patriotic labor."

PROMOTIONS.

The Army and Navy Journal of April 12, 1919, contained a column editorial on the subject of "Temporary Promotions in the United States Army." The subject of promotions is one that has caused more conjecture and worry than any other one thing connected with the organization of our large armies during this war.

Promotions for the regular army have always been and are now by seniority. However, with the passage of the Selective Service Act of May 18, 1917, promotions in the forces organized under that act were to be made by selection without regard to seniority. With the organization of the American Expeditionary Force, France, the situation was further complicated. The Commanding General, France, was given complete control over the promotions of all officers therein without regard to the War Department, Washington. The promotions were made in France and then the War Department notified that such officers were promoted, the promotions confirmed in Washington and commissions issued accordingly. This condition precluded the possibility of officers who were in France being recommended for promotions by the heads of their respective service in this country. Such a condition brought about so far as promotions were concerned practically two separate armies; one consisting of the American Expeditionary Force and the other, the army in the United States.

It was not until October 4, 1917, that an order was issued by the War Department, organizing the Veterinary Corps for the existing emergency under the authority conferred by Section 2 of the Act approved May 18, 1917. This order stated the number of officers allowed for various grades and provided further that these numbers should not be exceeded except in the grade of 2d lieutenant.

During the first months of the war, and prior to the organization of the veterinary service, commissions were issued for this

corps in the grade of 2d lieutenant only. A large number of these officers were sent to France prior to the organization of the Veterinary Corps above referred to and also before the organization could be put into effect in this country. The Veterinary Corps was no exception in this matter as the same condition prevailed in other branches of the service. The veterinary division, S. G. O., was soon confronted by the following situation. Veterinary officers in France could not be promoted except by approval of the Commanding General, A. E. F. Promotions could not be recommended by the director in Washington. The Corps was enlarging rapidly in this country and promotions had to be made for officers to command units being organized. There was only one solution: to promote men in the United States to the grades authorized for the number of officers on duty; to keep count of the total number of officers in France and hold as vacancies, the grades that number would be entitled to have. This would allow the promotions of our officers in France to the grade permitted according to the strength of the corps on duty there. This was done.

The functioning of the Veterinary Corps in the A. E. F. in accordance with S. R. No. 70, War Department, December 15, 1917, was not accomplished until September, 1918, when Colonel White was made Chief Veterinarian, Office of the Chief Surgeon, A. E. F. Previous to this time, the Corps was operating as a subsidiary organization of the remount service. Such were the prevailing conditions regarding promotions at the time the armistice was signed November 11, 1918. Immediately thereafter, an order was issued by the Secretary of War stopping all promotions from that date. This order in effect practically stopped all recommendations for promotions in the Veterinary Corps in this country that were made after November 1st. About 125 recommendations were returned from the Adjutant General's Office disapproved because of the above order. It might be noted also that all original appointments were stopped at the same time and approximately 150 recommendations for commission failed to receive action. This order stopped the appointment of the enlisted 1918 graduate veterinarians who were at Camp Greenleaf and candidates for commissions.

Probably due to the entirely inadequate previous promotions of the veterinary officers in France, there have been a number of promotions to the grades of 1st Lieutenant, Captain and Major since the armistice was signed. In this country, however, the

ruling of the Secretary of War has been strictly adhered to insofar as the Veterinary Corps is concerned.

On January 25, 1919, an announcement was made by Secretary Baker of the relaxation of the ruling previously made with reference to making no promotions. Such relaxation came as a result of widespread protest against the ban on army promotions announced immediately after the armistice. These promotions were to give rank appropriate to command in case of line officers and to actual employment in the case of staff officers, but promotions were not to be made for past services, however meritorious.

Par. 7, circular 79, reads: "No officer will be recommended for promotion unless the duty upon which he is engaged or to which he is to be assigned be commensurate with the advanced grade recommended and unless there is no officer of appropriate rank reasonably available for assignment to the duty in question, the officer making the recommendation will certify that these conditions are fulfilled." Though recommendations may be submitted as contemplated in circular letter 79, no promotions will be made without the personal approval of the Secretary of War. The memorandum also directs that replies to the following questions in the case of each recommendation be submitted:

(a) Is the promotion to give rank to actual employment?
(b) Is the promotion a reward for past service?
(c) Does the work on which the officer recommended for promotion is to be assigned required in the best interest of the United States, the advanced grade recommended?
(d) Is there any officer of appropriate rank reasonably available for assignment to the duty to which it is proposed to assign the officer recommended for promotion?

In face of these precautionary warnings, in practically every instance the recommendation was disapproved.

On March 31, 1918, a letter from the Chief of Staff reviewed the situation of promotions and closed with this statement "that a Chief of Staff Corps or Department must include in his certificate of recommendation the further statement that the interest of the United States will positively suffer if the promotion is not made." To quote the Army and Navy Journal article of April 12, 1918, which clearly sums up the situation, "On its face, this has every appearance of a stop order on the recommendations invited by circular letter 79 and in the memorandum of March 3, 1919."

The following orders of transfer and reassignment of veterinary officers have been issued during the past month:

1. Major D. J. Lynch, V. C., from A. R. D., Camp McClellan, Ala., to A. R. D., Fort Bliss, Texas, for duty as The Veterinarian.

2. Major Joseph W. Burby, V. C., from Camp Jackson, S. C., to Camp Gordon, Ga., for duty as Camp Veterinarian.

3. Major Wm. P. Hill, V. C., from A. R. D., Camp Meade, Md., to A. R. D., Camp Travis, Texas, for duty as The Veterinarian.

4. Major Harry F. Steele, V. C., R. A., from U. S. Army General Hospital, East View, N. Y., to Fort Sam Houston, Texas, for duty as Assistant to the Department Surgeon, Southern Dept.

1. Captain Gordon B. Huse, V. C., from A. R. D. No. 320, Camp Custer, Mich., to Camp Lee, Va., for duty at the Camp Veterinary Hospital

2. Captain Will C. Griffin, V. C., will report for duty as the Camp Veterinarian, Camp Harry J. Jones, Ariz.

3. Captain Ivan L. Barstow, V. C., from Camp Dix, N. J., to Aberdeen, Md., for duty as The Veterinarian.

1. 1st Lieut. Ion W. Parks, V. C., from Camp MacArthur, Tex., to Ft. Sam Houston, Tex., for duty as Assistant to the Post Veterinarian.

2. 1st Lieut. Fred L. Seevers, V. C., from A. R. D. No. 313, Camp Shelby, Miss., to A. R. D. No. 315, Camp Jackson, S. C., for duty.

3. 1st Lieut. John A. Phillips, V. C., from Camp Dix, N. J., to Ft. McIntosh, Tex., for duty as The Veterinarian, Laredo District.

4. 1st Lieut. Howard W. Wilson, V. C., from A. R. D. No. 317, Camp Pike, Ark., to A. R. D. No. 327, Ft. Sill, Okla., for duty

5. 1st Lieut. Oscar E. Gladfelter, V. C., from A. R. D., Ft. Bliss, Tex., to Chicago, Ill., for instruction in meat inspection.

6. 1st Lieut. Wm. E. Spierling, V. C., from A. R. D. No. 307, Camp Wadsworth, S. C., to Field Remount Squadron No. 353, Camp Wadsworth, S. C., for duty as The Veterinarian.

7. 1st Lieut. Dennis S. Shannon, V. C., from Camp McClellan, Ala., to Port of Embarkation, Newport News, Va., for duty.

8. 1st Lieut. Clifton G. Crumpacker, V. C., from A. R. D. No. 309, Camp McClellan, Ala., to Ft. Reno, Okla., for duty as Assistant Veterinarian.

9. 1st Lieut. Chester L. Nelson, V. C., from A. R. D. No. 309, Camp McClellan, Ala., to A. R. D. No. 329, Camp Travis, Tex., for duty.

10. 1st Lieut. Charles E. Richardson, V. C., from A. R. D. No. 309, Camp McClellan, Ala., to A. R. D. No. 329, Camp Travis, Tex., for duty.

11. 1st Lieut. William S. Ford, V. C., from Camp Dix, N. J., to Garden City, L. I., N. Y., for duty as C. V., Air Service Depot, that place.

12. 1st Lieut. Samuel H. Saul, V. C., has been relieved from duty as Assistant to the Dept. Surgeon, Panama Canal Zone, and directed to proceed to his home and return to the retired list.

13. 1st Lieut. Earl P. Gordon, V. C., from Camp Dix, N. J., to Fort Riley, Kansas, for duty at the Mounted Service School.

14. 1st Lieut. John K. McConeghy, V. C., from Aberdeen, Md., to San Francisco, Calif., thence to Vladivostok for duty with the American Expeditionary Forces, Siberia.

15. 1st Lieut. Harry Dixon, Jr., from A. R. D., Camp MacArthur, Texas, to San Francisco, Calif., thence to Vladivostok for duty with the American Expeditionary Forces, Siberia.

16. 1st Lieut. George H. Seaver, V. C., from Camp Lewis, Wash., to A. R. D., Camp Kearny, Calif., for duty.

17. 1st Lieut. F. B. Croll, V. C., from A. R. D., Camp Dodge, Iowa, to A. R. D., Camp Funston, Kan., for duty.

18. 1st Lieut. Fred L. Baer, V. C., from A. R. D., Camp Sheridan, Alabama, to A. R. D., Camp Travis, Texas, for duty.

19. 1st Lieut. S. W. Stokes, V. C., from Camp Grant, Ill., to A. R. D., Camp Grant, Ill., for duty.

20. 1st Lieut. George S. Place, V. C., from duty at Port of Embarkation, Newport News, Va., to A. R. D., Fort Sill, Oklahoma, for duty.

1. 2nd Lieut. Emil E. Weller, V. C., from A. R. D. No. 329, Camp Travis, Tex., to Camp Travis, Tex., as Assistant to the C. V.

2. 2nd Lieut. Robert H. Campbell, V. C., from Camp Dix, N. J., to A. R. D. No. 329, Camp Travis, Tex., for duty.

3. 2nd Lieut. Harry L. Watson, V. C., from A. R. D. No. 313, Camp Shelby, Miss., to A. R. D. No. 315, Camp Jackson, S. C., for duty.

4. 2nd Lieut. Harry I. Stanton, V. C., from A. R. D. No. 309, Camp McClellan, Ala., to Douglas, Ariz., for duty with the 1st Cavalry.

5. 2nd Lieut. Harry C. Fullington, V. C., from A. R. D. No. 316, Camp Gordon, Ga., to Camp Bowie for duty as Assistant to the C. V.

6. 2nd Lieut. Warren R. Sheff, V. C., from Camp Dix, N. J., to the Canal Zone, Panama Canal Department, for duty.

7. 2nd Lieut. Noah J. Elder, V. C., from A. R. D. No. 305, Camp Lee, Va., to Camp Bragg, Fayetteville, N. C., for duty as Assistant to the C. V.

8. 2nd Lieut. A. E. Joseph, V. C., from Camp Dix, N. J., to Fort Warren, Mass., for duty as The Veterinarian in the Coast Defenses of Boston.

9. 2nd Lieut. L. T. Nagel, V. C., from Port of Embarkation, Newport News, Va., to North Charleston, S. C., for duty.

10. 2nd Lieut. Wm. A. Martin, V. C., from A. R. D., Camp Sheridan, Ala., to Fort Bliss, Texas, for duty with the 82nd F. A.

11. 2nd Lieut. W. F. Ridley, V. C., from Camp Dix, N. J., to A. R. D., Camp Devens, Mass., for duty.

The following officers have been honorably discharged from the Veterinary Corps, United States Army:

1. Major E. B. Ackerman, U. S. A., who was on duty as The Veterinarian, Camp McClellan, Ala.

2. Major John H. Blattenberg, U. S. A., who recently returned from duty with the American Expeditionary Forces, France.

3. Major Harry W. Brown, who has just returned from services overseas.

4. Major R. M. Staley, who has been acting as General Veterinary Inspector for the Southern Department.

1. Captain V. F. Pruden, who was on duty as Camp Veterinarian, Camp Hancock, Ga.

2. Captain R. H. Sewell, who was on duty as Camp Veterinarian, Camp Travis, Tex.

3. Captain C. H. Hoffmire, who recently returned from the American Expeditionary Forces, France, where he was on duty with Veterinary Hospital No. 6.

4. Captain N. B. Giles, who was on duty at the A. R. D., Camp Beauregard, La.

5. Captain Wm. A. Bright, who was on duty as Camp Veterinarian, Camp Sheridan, Ala.

6. Captain R. E. Kyner, who recently returned from duty with the American Expeditionary Forces, France.

7. Captain G. E. Bartholomees, who was on duty as Camp Veterinarian, Camp Beauregard, La.

8. Captain T. B. Hinkle, who was on duty at A. R. D. No. 329, Camp Travis, Tex.

9. Captain C. F. Henry, who was on duty as Zone Veterinarian, Kansas City, Mo.

10. Captain Ralph M. Bell, who was on duty as The Veterinarian, A. R. D. No. 304, Camp Meade, Maryland.

11. Captain William E. Muldoon, who was on duty at the Camp Veterinary Hospital, Camp Lee, Va.

12. Captain Omar T. Atwood, who has recently returned from the American Expeditionary Forces.

13. Captain Thomas J. Quinn, who has recently been on duty with the American Expeditionary Forces.

The following 1st Lieutenants, V. C., U. S. A., have been honorably discharged during the past month:

1st Lt. N. A. Roettiger
1st Lt. P. J. Creedon
1st Lt. C. H. Wight
1st Lt. L. C. Martin
1st Lt. R. W. McKibbin
1st Lt. E. D. King, Jr.
1st Lt. J. B. McClellan
1st Lt. O. M. Webb
1st Lt. R. L. South
1st Lt. L. W. McElyea
1st Lt. J. F. Jansen
1st Lt. Jay E. Nixon
1st Lt. C. T. Chamberlain
1st Lt. C. B. Lenker
1st Lt. W. J. Schimmel
1st Lt. A. T. Cornell
1st Lt. V. C. Bartlett
1st Lt. Will W. Korb
1st Lt. F. W. Graves
1st Lt. A. C. Morrow
1st Lt. L. W. Rowles
1st Lt. J. C. Hoover
1st Lt. E. M. Hough
1st Lt. E. J. Watters
1st Lt. Edw. M. Lynn
1st Lt. Darrell E. Trump
1st Lt. Howard W. Naylor
1st Lt. F. J. Scheloski
1st Lt. F. E. Kunze
1st Lt. J. A. Tognotti
1st Lt. E. S. Carter
1st Lt. John N. Egan
1st Lt. Emory E. Hobson
1st Lt. Geo. J. Goubeaud
1st Lt. Oliver A. Taylor
1st Lt. E. H. Lenheim
1st Lt. R. B. Jones

The death of 1st Lieut. J. D. Lee, V. C., N. A., who was on duty with the American Expeditionary Forces in France, has been reported. He was suffering from broncho-pneumonia.

The following 2nd Lieutenants, V. C., U. S. A., have been honorably discharged during the past month:

2nd Lt. S. Yetter
2nd Lt. J. S. Dick
2nd Lt. E. D. Harris
2nd Lt. R. E. Libby
2nd Lt. H. B. Weeden
2nd Lt. A. H. Kerr
2nd Lt. Geo. D. Anderson
2nd Lt. E. W. Pierce
2nd Lt. E. Bruce
2nd Lt. L. A. Huseby
2nd Lt. E. E. Watson
2nd Lt. H. F. Walker
2nd Lt. W. H. McKahan
2nd Lt. C. E. Wood
2nd Lt. J. C. Mitchell
2nd Lt. L. V. Walker
2nd Lt. Clarence L. Young
2nd Lt. F. M. Nelson
2nd Lt. E. C. Reither
2nd Lt. G. J. Lengerich
2nd Lt. J. E. Randall
2nd Lt. W. J. Kiff
2nd Lt. Wm. H. Shannon
2nd Lt. G. H. Starr
2nd Lt. W. N. Timblin
2nd Lt. E. A. McCain
2nd Lt. F. F. Rosenthal
2nd Lt. H. W. Schirmer
2nd Lt. Richard I. Kerley
2nd Lt. E. C. Baker
2nd Lt. J. R. Barnes
2nd Lt. J. H. Kitzhofer
2nd Lt. C. E. Freeman
2nd Lt. R. B. Whitesell
2nd Lt. Karl A. Trish
2nd Lt. A. G. Frees
2nd Lt. H. V. Cardona
2nd Lt. F. Edwards
2nd Lt. G. C. Greene
2nd Lt. J. A. Flinn
2nd Lt. J. M. Herron
2nd Lt. E. Kernohan
2nd Lt. D. W. Wright
2nd Lt. P. E. Phillips
2nd Lt. A. M. Stark
2nd Lt. E. M. Ogram
2nd Lt. R. H. Gittins
2nd Lt. Joseph H. Stephens
2nd Lt. John F. Rock
2nd Lt. S. P. Ragan
2nd Lt. Wm. J. Cozad
2nd Lt. James L. Sanders
2nd Lt. Edw. A. Cholvin
2nd Lt. Herbert T. Cook
2nd Lt. Charles S. Babcock
2nd Lt. E. W. Kern
2nd Lt. E. B. Jordan
2nd Lt. J. E. Reedy
2nd Lt. T. L. Knapstein
2nd Lt. W. A. Hahn
2nd Lt. T. V. Ward
2nd Lt. Howard F. Roberts
2nd Lt. J. W. Boylston
2nd Lt. W. E. Fritz
2nd Lt. G. Smith, Jr.
2nd Lt. John S. Nicholas
2nd Lt. Leland G. Dassance
2nd Lt. Harry H. Owen

The following veterinarians, with the rank of Captain in the Veterinary Corps, Regular Army, have been restored to the rank of Major in the Veterinary Corps, Regular Army, as a result of the decision of the Comptroller of April 9, 1919:

1. Frederick Foster.
2. Gerald E. Griffin.
3. Charles D. McMurdo.
4. William G. Turner.
5. William V. Lusk.
6. Olof Schwartzkopf.
7. Joseph R. Jefferis.
8. Harry F. Steele.

OFFICERS, VETERINARY CORPS, UNITED STATES ARMY.

	On Duty April 11, 1919.	On Duty May 11, 1919
Colonels	0	0
Lieutenant Colonels	2	2
Majors	78	75
Captains	182	173
First Lieutenants	487	462
Second Lieutenants	555	503
	1304	1215

Major John H. Gould, V. C., who was Chief Veterinarian, second army, from December 1st, 1918, to April 15th, 1919, when this army was officially disbanded, has been transferred as Chief Veterinarian to the third army with station at Army Headquarters, Coblenz, Germany.

Major Harold E. Bemis, V. C., who has been Chief Veterinarian, third army, is to be ordered to the United States for discharge.

Major Walter Fraser, V. C., who has been on duty with General Headquarters, Chaumont, France, has been relieved and made Assistant Chief Veterinarian, Advance Zone, relieving Major Reuben Hilty, who has been ordered to the United States.

The following officers, now serving with the Veterinary Corps, American Expeditionary Forces, have been promoted to the grades noted:

1st Lieutenant to Captain.

1. Raymond Randall.
2. Michael Donahoe.
3. Charles P. Bishop.
4. George E. Butin.

2nd Lieutenant to 1st Lieutenant.

1. Emory W. Tolley.

Dr. J. C. Corlies of Newark, New Jersey, who graduated in 1876, nearly forty-five years ago, still remains active and vigorous and deeply interested in every humane aspect of his profession. When recently appealed to to honor his State in the field of veterinary medicine he became a prompt contributor to the laudable undertaking of establishing a state scholarship.

ASSOCIATION NEWS.

AMERICAN VETERINARY MEDICAL ASSOCIATION.

COMMITTEE APPOINTMENT BY THE PRESIDENT.

Major C. B. McMurdo has resigned from the Committee on Veterinary History of the American Veterinary Medical Association, as he was unable to give the necessary time and attention to the committee work. President V. A. Moore has appointed Major A. L. Mason of the army to succeed Major McMurdo on this committee.

N. S. MAYO.

SECRETARY'S OFFICE.

Recently letters have been sent to all Resident Secretaries of the A. V. M. A., advising them definitely of the date of the New Orleans meeting and urging them to canvass the profession in their state for new A. V. M. A. members and also to assist in securing brief, practical papers for the program, as well as articles and news notes for the Journal. Most of the Secretaries are responding promptly to the appeal.

Letters have also been sent to more than a hundred and fifty applicants who filled out application blanks at Camp Greenleaf last fall but who had not sent in any remittance with their applications. These applications were secured by Captains Longley, Lambert, McGuire, Hickman and others. Practically all of these veterinarians have been discharged from the service and many of them are sending in the necessary remittance to go with the application. Just as soon as the remittance is received their names are sent to the editor and their subscriptions to the Journal are started.

President V. A. Moore has appointed Dr. C. E. Swail of Colebrook, New Hampshire, as Resident Secretary of that state to succeed Dr. Farmer, who has removed from the state.

Dr. G. A. Roberts, professor of veterinary science at the North Carolina Agricultural and Mechanical College at West Raleigh, has resigned as Resident Secretary of North Carolina. Dr. Roberts is going to Sao Paulo, Brazil, for the International Health Board, Rockefeller Foundation, to be with the laboratory

of hygiene, Sao Paulo Medical School. He expects to leave for South America about June 1. Dr. Roberts is one of the "live wires" in the veterinary profession in the southern states and he will be greatly missed.

A meeting was called by President Dunphy in Chicago on May 5 to plan for the program of the United States Live Stock Sanitary Association meeting the first of next December. Those present were Drs. Geo. Dunphy, D. M. Campbell, J. I. Gibson, N. S. Mayo, and Mr. H. R. Smith. Plans were outlined for this meeting and it is believed the program will be excellent. The meeting will be held on December 1, 2 and 3, 1919, Chicago. This is also the week of the International Live Stock Exposition.

N. S. MAYO.

DISTANCES FROM VARIOUS CITIES TO NEW ORLEANS, THE CONVENTION CITY.

In this issue of the Journal the writer has endeavored to submit some correct mileage data which may serve as a guide to those contemplating a visit to the next meeting of the American Veterinary Medical Association in New Orleans, Louisiana, from November 17 to 21, inclusive. In this announcement, the information is taken from various railroad folders; therefore, much dependence can be placed upon the figures.

The most distant city in the States appears to be Seattle, Washington, but this should, in no way, discourage a member from attending. On the other hand, a decision on the part of any veterinarian to journey 3,500 miles to the meeting in New Orleans will be a benefit to himself in four ways, notably, an observation trip; a splendid opportunity to see one of the most unique and interesting cities in America; the educational feature of the Association; and last but not least, a vacation at the close of the year, from the cares of the snow shovel to the music of the lawn mower.

Atlanta, Ga.	To New Orleans	493
Boston, Mass.	To New Orleans	1,375
Bristol, Va.	To New Orleans	739
Buffalo, N. Y.	To New Orleans	1,279
Butte, Mont.	To New Orleans	3,183
Chattanooga, Tenn.	To New Orleans	498
Chicago, Ill.	To New Orleans	930

Cincinnati, Ohio	To New Orleans	835
Cleveland, Ohio	To New Orleans	1,098
Dallas, Texas	To New Orleans	515
Denver, Colo.	To New Orleans	1,527
Des Moines, Iowa	To New Orleans	1,291
Detroit, Mich.	To New Orleans	1,172
El Paso, Texas	To New Orleans	1,161
Indianapolis, Ind.	To New Orleans	909
Jacksonville, Fla.	To New Orleans	612
Kansas City, Mo.	To New Orleans	887
Los Angeles, Cal.	To New Orleans	2,003
Louisville, Ky.	To New Orleans	787
Memphis, Tenn.	To New Orleans	456
Milwaukee, Wis.	To New Orleans	1,060
Minneapolis, Minn.	To New Orleans	1,338
New York, N. Y.	To New Orleans	1,252
Omaha, Neb.	To New Orleans	1,417
Philadelphia, Pa.	To New Orleans	1,191
Phoenix, Ariz.	To New Orleans	1,628
Portland, Me.	To New Orleans	1,484
Portland, Ore.	To New Orleans	3,259
Salt Lake City, Utah	To New Orleans	2,786
San Francisco, Calif.	To New Orleans	2,487
Seattle, Wash.	To New Orleans	3,442
St. Louis, Mo.	To New Orleans	718
Toronto, Canada	To New Orleans	1,380
Washington, D. C.	To New Orleans	1,117

The following well-equipped railroads enter the city of New Orleans, using three separate depots:

Illinois Central—From Chicago, St. Louis, Mo., Louisville, Ky., and Memphis, Tenn.

Louisville & Nashville—From Cincinnati, Ohio; Louisville, Ky.; New York; Atlanta, Ga.; and Birmingham, Ala.

Louisiana Railway & Navigation Company—From Shreveport and Alexandria, La.

New Orleans & Great Northern—From Jackson, Miss.

New Orleans & Northeastern (inlet for the Southern Railway System)—From New York; Washington, D. C.; Philadelphia, Pa.; Cincinnati, Ohio; Chattanooga, Tenn.; Greensboro, N. C.; and Atlanta, Ga.

New Orleans, Texas & Mexico (Frisco Lines)—From San Francisco, Calif.; El Paso, San Antonio and Houston, Texas; and Baton Rouge, La.

Southern Pacific—From Los Angeles, Calif.; El Paso, San Antonio, Texas.

Texas & Pacific—From El Paso, Fort Worth, and Dallas, Texas; and Shreveport and Alexandria, La.

Yazoo & Mississippi Valley—From Memphis, Tenn.; Vicksburg, Miss.; and Baton Rouge, La.

In connection with this meeting negotiations are now pending to provide reduced fares for the trip, the results of which will appear in an early number of the Journal.

E. I. SMITH,
Secretary-Treasurer and Chairman Arrangements,
Louisiana Veterinary Medical Association.

SOUTH DAKOTA LIVE STOCK SANITARY BOARD TO MEET IN JUNE.

The regular meeting of the State Live Stock Sanitary Board of South Dakota, which includes the Board of Veterinary Medical Examiners, will be held on the last Tuesday in June at the offices of the Board, Pierre, South Dakota. At this time examinations will be held for license to practice in the state.

The requirements are that diploma be submitted from a recognized veterinary college, for verification, that a fee of $10.00 be paid and that applicant pass an examination before the Board, which examination includes only such subjects as are taught in the curricula of veterinary colleges recognized by the said Board.

A. E. BEAUMONT, Secretary.

DARWIN AND THE MULE.

Charles Darwin, the distinguished scientist, paid this fine, and just, tribute to the too often maligned mule:

"He always appears to be a most surprising animal. That a hybrid should possess more reason, memory, obstinacy, social affection, and powers of muscular endurance than either of its parents seems to indicate that art has here outmastered nature."

This testimony is supported by all the intelligent men we have ever met who really knew the mule.—Ex.

OTHER ASSOCIATIONS

CHICAGO VETERINARY MEDICAL ASSOCIATION.

The monthly meeting of this association was held at the Great Northern Hotel on April 8. Dr. Mayo gave a brief account of the Chemical Foundation, organized to manufacture medicinal preparations and dyes under German patents that had been taken over by the United States Government.

The Chemical Foundation is capitalized at $500,000 and has purchased from the United States Government German patents to the amount of $250,000. A number of patents are still held by the United States Government and various manufacturers have been licensed to manufacture medicinal preparations under these patents. At the present time the output of Barbital (Veronal) by American manufacturers is approximately one ton per month.

The Chemical Foundation was not organized as a profit-making venture. The returns after deducting six per cent are to be used for research work along medicinal and chemical lines.

The question of giving a full dose of arecoline in the early stages of laminitis in horses as first advocated by Frohner was discussed. It was the general opinion that excellent results were obtained if the laminitis was not traumatic and if the arecoline was administered in the early stages of the disease. Cold packs to the feet were also considered valuable.

A lively discussion followed as to the cause of most cases of acute laminitis. The prevailing opinion was that most cases were due to the formation of toxins in the intestinal tract and quick elimination followed by intestinal antiseptics gave excellent results as a treatment.

A demonstration was also given of a small and inexpensive apparatus for vaporizing iodine crystals and blowing the vapor into cavities where the antiseptic action of iodine was desired.

The association dscussed the proposed veterinary practice act now before the Illinois legislature and a committee was appointed to investigate some points in the bill not well understood.

N. S. M.

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY.

APRIL MEETING.

The regular monthly meeting of the Veterinary Medical Association of New York City was called to order in the lecture room of Carnegie Laboratory, 338 East 26th Street, New York City, Wednesday evening, April 2, at 8:30 o'clock., by President Cochran.

The minutes of the March meeting were read and approved.

Dr. Adolph Eichhorn, Pearl River, New York, read a most interesting and valuable paper on pre-war meat inspection and sanitary conditions of public abattoirs in various countries in Europe. The Doctor gave a clear-cut description of the abattoirs of France, Germany and Austria-Hungary, his paper being thoroughly enjoyed by the members and afterwards discussed in a very interesting way.

Dr. Eichhorn was followed by Dr. Harry Ticehurst, Morsemere, New Jersey, with a well-written paper on necrobacillosis in the army horses and mules. The Doctor stated that this disease was the greatest menace the army veterinarian had to deal with. He attributed the cause to the assembly of large numbers of animals in comparatively small areas with poor sanitation, the animals standing in mud and manure. The disease was more severe in the remounts than at the training camps, due to better sanitary conditions at the latter. The treatment which proved most efficacious is the applying over the whole affected part a paste made by mixing equal parts of zinc sulphate and lead acetate with a little water. Ten per cent silver nitrate solution was also found to be very effectual when applied twice daily. The chief seat of infection was generally the frog, and if not attended to promptly the disease spread rapidly to the laminæ, coronary band, fetlocks and pasterns. Such cases frequently developed a general infection with septicemia following. The Doctor augmented his paper with records of a number of cases that came under his notice when in the army service, stating that he had records of over three hundred cases of infected frogs which were removed and treated and quick recoveries made. In the second week in February, 1918, out of 6,000 animals in the remount station at that time, 1,743 were in the hospital, and of these 96 per cent were suffering from dermatitis and necro-

bacillosis infection. This paper brought out a good discussion, which was joined in by Drs. Berns, McKinney, Lowe and Dean Hoskins.

Major Ackerman was present and gave an enjoyable talk on his experience in the army service. Dr. Cassius Way, chairman of the Committee on Arrangements for the State Veterinary Medical Association meeting, to be held in Brooklyn this summer, asked the members for their coöperation in making the meeting a success.

Dr. A. J. Allott, 309 West 70th Street, New York City, and Dr. W. H. Hayes, 129 East 75th Street, New York City, were elected to membership in the association.

A vote of thanks was extended to Dr. Eichhorn, Dr. Ticehurst and Major Ackerman for their contributions to the program of the evening.

No further business appearing, the meeting adjourned.

MAY MEETING.

The regular monthly meeting of the Veterinary Medical Association of New York City was held in the lecture room of the Carnegie Laboratory, 338 East 26th Street, New York City, Wednesday evening, May 7, 1919, at 8:30 o'clock, President Cochran in the chair.

The minutes of the April meeting were read and approved.

Dr. Theo. F. Krey of Parke, Davis & Co. introduced a new local anæsthetic, "apothesine." This has been tried out successfully in human practice. It has all the advantages of cocaine, is cheaper and non-toxic, and does not retard healing and escapes the Harrison law. The Doctor gave a sample tube of 2½-grain tablets to the gentlemen present to try out for experimental purposes.

Lieutenant Max Danziger, lately returned from overseas with the 77th Division, was asked by the President to relate some of his experiences in the Army Service. The Lieutenant responded generously and said that at a later meeting he would be better prepared to report.

Captain Charles S. Chase was also called upon, but asked to be excused till a later meeting.

Dr. John F. DeVine, Goshen, New York, gave an instructive address on "Diagnosis of Pregnacy, Sterility, and Abortion." The Doctor cited some interesting cases of diagnosis of pregnancy

which had come under his observation in his extensive cattle practice. The Doctor's address called forth numerous questions from the members, which he answered very fully and satisfactorily.

Under case reports, Dr. R. W. Gannett mentioned having had capital success in treating open and infected tarsal sheath "hock-joint" by cutting the perforans tendon. Dr. R. W. Ellis reported a case of plastic surgery in an English bulldog. This dog had a dislocation of patellar and tarsal joints with adhesions, the leg being badly twisted out of shape. The dog was put under chloroform, the adhesions broken down and the leg and hip joint put in plaster for one month, the result being a capital recovery. The Doctor exhibited two photographs taken before and after treatment. Dr. R. W. Gannett mentioned that the National Geographic Magazine for March contained some excellent photographs of famous champion dogs and that it could be obtained at Hubbard Memorial Hall, Washington, D. C. Dr. C. G. Rohrer reported a case of a Boston terrier bitch which had great difficulty in passing urine. On examination a tumor was discovered directly over the bladder. The Doctor destroyed the bitch and removed the bladder and new growth, which he exhibited at the meeting.

Dr. George H. Berns mentioned the recent death of Dr. McKinney's only son in an airplane accident in Switzerland. The President asked that a rising vote of sympathy be extended to Dr. McKinney in his bereavement, and appointed a committee of three to draft suitable resolutions.

Dr. James W. Flynn, 463 52nd Street, Brooklyn, was unanimously elected to membership in the association.

Dr. R. W. Gannett made a protest against the action of the A. S. P. C. A. ambulances coming and taking horses which are injured on the streets in spite of the protests of the attending veterinarians. It was regularly moved, seconded and carried that the Secretary be instructed to write a letter to the President of the A. S. P. C. A., asking that this practice be modified.

No further business appearing, the meeting adjourned.

J. ELLIOTT CRAWFORD, Secretary.

Lieutenant M. R. Sebright is with the 308th Mobile Veterinary Section and is now stationed at Wengerohr, Germany, A. P. O. 792. He says that mail reaches him after a time and is very welcome.

ASSOCIATION OF STATE AND PROVINCIAL VETERINARY COLLEGES.

REPORTS OF COMMITTEES.

Committee on Curriculum.

The committee appointed by Chairman H. S. Murphey to present to the association at its meeting in Philadelphia facts and data concerning an ideal curriculum wishes to submit the following brief report:

The committee unanimously agree that at the present time it is impossible to properly present this matter to the association for the following stated reasons:

1. The present world war has depleted the faculties of all of the state schools in that they are assisting in various ways with the Veterinary Corps of the National Army. It is worthy of mention that the veterinary colleges have responded as a unit in the present emergency. This has created new duties and responsibilities for those in the service of our country and those left on duty in the various colleges, which has demanded their entire time and attention. Numerous changes and shifts have been made in the faculties to meet this emergency. In view of these added duties and responsibilities, the veterinary faculties have not had time to consider seriously such an important question during the past year.

2. It has been practically impossible to secure data from a number of the schools in the United States, and practically none from the European schools. It is highly desirable to secure information from all of these colleges before such an important piece of work be attempted. The inability to secure this data was no doubt due in a large measure to the changed conditions in the colleges as stated in item 1.

3. Some of the state veterinary colleges have recently made a change in their curricula from three to four years. In these cases it seemed to them desirable to continue on their present curricula for at least another year or two longer before they would be able to decide concerning what changes should be made to constitute the basic principles of an ideal or standard curriculum. In some cases the feeling seemed to prevail that their curricula as they are arranged at present are ideal.

4. The present world war is bringing new problems into veterinary education for solution. The curricula of the colleges

must be changed to meet these newer conditions. In order to establish a standard scheme of education for the veterinarian for the future these educational problems growing out of the present war must be met and the curricula standardized to meet them. It is needless to mention the fact that there is a rapid evolutionary process taking place at present in veterinary education in the United States. All of these facts lead the committee to believe that delay in adopting any particular scheme at present is advisable until conditions in education and those affecting the colleges become more stable.

It is recommended that a committee be appointed to continue the study of this question to be reported at a future meeting of the association. O. V. BRUMLEY, Chairman.

COMMITTEE ON TEACHING BACTERIOLOGY.

Bacteriology, as a science, came into existence as a result of the investigations of Pasteur and his co-workers on the cause of fermentation and the etiology of epidemic and epizoötic diseases. The extension of these studies has shown bacteriology to be the great interpreter of many natural phenomena and consequently it has become a many-sided subject. While it is natural, from the origin of the science, to first think of bacteriology in connection with infectious diseases, the truth is that there are numerous and important human activities which depend upon it quite as much as pathology and sanitary science. It is possible, therefore, for one to qualify as a bacteriologist and still be without knowledge of the aims and purposes of this science in a veterinary curriculum.

The formulation of a course of instruction in bacteriology for a veterinary curriculum requires the careful consideration of a number of topics. These pertain to the subject matter, the methods employed in teaching it and the application of the science to practical medicine, surgery and sanitary science. In the time that can be devoted to this subject in a four-year curriculum, it is impossible to follow out details in all instances and consequently emphasis should be placed on fundamental principles governing both the knowledge of the subject and its utilization.

It is essential to keep in mind that in an undergraduate course we are not training men to be bacteriologists, but, rather, that we are endeavoring to teach those things in bacteriology that are applicable to the practice of veterinary medicine and live stock

sanitation. There are many subjects in bacteriology that are of great interest to a bacteriologist which are of little significance to a veterinary student who is going to use this science as an aid in the diagnosis, treatment and control of infectious diseases or in the treatment of medical and surgical cases. The student should come to realize that bacteriology is a science, that he must understand its principles and that he must know thoroughly the details that are applicable in the general practice of veterinary medicine.

As the details depend largely upon the teacher, the time allotted to the course and the facilities for laboratory work and demonstrations, your committee respectfully submit the appended suggestions regarding subject matter, methods of instruction, equipment, time given to the subject, place in the curriculum, qualifications of teachers and library facilities as fundamental in conducting successfully courses of instruction in bacteriology in veterinary colleges.

1. *Subject Matter.* The course should include, first, the elements of the science of bacteriology, such as the classification, morphology, distribution and function of bacteria; the principles of sterilization and disinfection, the isolation and cultivation of microörganisms and workable methods for the same; the kinds and sources of bacteria found in water, milk and animal excreta; the relation of bacteria to disease and the elements of immunity. Secondly, the student should study certain of the bacteria that cause disease in the lower animals, their life requirements, peculiar cultural or staining properties, channel of infection, means of escape from the infected animal and the fate of the organisms outside of their host. If there is not a separate course on protozoa, the essentials of protozoölogy, including the life history and descriptions of species pathogenic for animals, should be included in the course in bacteriology. It is believed that at present it is best to include pathogenic fungi and protozoa in the course in bacteriology.

In addition to this preliminary course there should be an advanced or special one on the reaction of tissues to bacterial and foreign protein, the preparation, significance and use of vaccines, bacterins, antitoxins and serums, together with the principles of immunity and the methods for establishing the same. Practical instruction should be given in laboratory diagnosis, including both bacteriological examinations and serological tests.

2. *Methods of Teaching.* Experience has shown that this subject can be taught best by a combination of lectures, recitations and laboratory work following a text-book and well-organized laboratory exercises. The lectures are valuable in giving the proper perspective to the subject; the recitations are necessary to ascertain that the student has the correct meaning and understanding of the terms and facts as given in the text-book and lectures; and the laboratory work is required to give actual experience in handling bacteria and in bacteriological methods. The principles of diagnosis and prophylaxis are taught better and more fully comprehended by the student in well-directed laboratory exercises than by any other means. In such exercises the student is disciplined in the subject so that later in practice he instinctively guards against infection, recognizes the importance of early diagnosis and hastens to institute measures for prevention and control.

3. *Equipment.* There is no subject in the technique of which greater care and skill is necessary than in bacteriology. This must be acquired, in a certain degree at least, by each student before he arrives at a working understanding of the subject. For this part of the work a laboratory is a necessity and for this laboratory certain equipment is indispensible. This need not be elaborate, but should be adequate to enable each student to do individual work. For example, each student should be furnished for his individual use a good compound microscope equipped with dry lenses, an oil immersion objective and an Abbe condensor, a hand magnifier giving magnification of 3 to 10 diameters, a platinum loop and needle, proper table and incubator space, antiseptics, stains and sufficient media and glassware for the exercises. He should also have access to sufficient space in the sterilizing apparatus to enable him to do his own sterilization so that he may practice the methods and observe results. There are many other appliances which make for better work and greater convenience and for these reasons are desirable but which can hardly be classed among the indispensibles for good instruction.

4. *The Place in the Curriculum and Hours Credit.* It is our opinion that the elementary instruction in bacteriology should be given in the second year of a four-year curriculum and that the advanced course involving specific reactions for diagnosis, immunity and biologic prophylactics should be given in the

fourth year. This seems to place them in a logical sequence in reference to the basic sciences and applied subjects.

The time devoted to the preliminary course should be not less than five and preferably six credit hours. We approve of one lecture, two recitations and three laboratory periods of not less than two and one-half hours each weekly for one-half year. It is necessary, however, that the individual teacher should arrange these details as suited best to his personal ideas and methods of instruction.

The time allotted to the *advanced* course should be at least three credit hours and the subject taught preferably in the first term of the fourth year. This course should consist of one lecture and two laboratory periods weekly. Because of the expense in securing the requisite number of experimental animals for individual work, it is believed students can work in groups of from two to six with advantage and that demonstrations can be substituted for certain parts of it.

5. *Qualifications of the Teacher.* As the purpose of bacteriology is to explain the phenomena of infection, the spread of epizoötic diseases, methods of diagnosis, the theories of immunity, the production of vaccines, bacterins, antitoxins and serums, together with the more common functions of bacteria, it is essential that the teacher of this subject should have not only a thorough knowledge of bacteriology itself but also a fundamental training in pathology and the tissue changes stimulated by microörganisms. Unless the teacher is familiar with these subjects he cannot bring about the proper attitude in the student's mind toward bacteria in their relation to animal disease nor impress upon him the importance of the subject.

As bacteriology, as applied to medicine, is an integral part of pathology, medicine, surgery and sanitary science, it should be taught in such a way that the student will see and understand this correlation of subjects.

6. *Bacteriological Literature.* Of first importance is a good reference library so conveniently located that it confronts the student in his daily work. It should contain a good assortment of text and reference books on bacteriology and protozoölogy, together with the current journals on these and closely allied subjects, such as the Journal of Infectious Diseases and Medical Research. There should be a special effort to have the students familiarize themselves with the literature of the subject. Special attention should be called to important papers and if possible

abstracts of a few of them should be made by the students and criticised by the teacher. It is to the current literature that the practitioner must go for new knowledge of the subject. For this reason students should be carefully inducted into the habit of using books and journals.

As applied to medicine, bacteriology has for its purpose the elucidation of one of the great causes of disease, namely, *infection*. It explains the meaning of infection in its multitudinous forms. As a science, it provides methods for the prevention of infections and theories for the explanation of the reaction of the body tissues to the invasion of microörganisms.

We believe the subject matter and methods suggested in this report include as much of bacteriology as can be wisely taught in an undergraduate veterinary course.

V. A. MOORE,
W. J. CROCKER,
C. D. RICE,
Committee.

COMMITTEE ON METHODS OF TEACHING ANATOMY.

In view of the fact that it would not be feasible to formulate our report by means of meetings of the committee and that it is scarcely practicable to do so satisfactorily by correspondence, it seemed that our objective could be attained best by a division of the work among the members of the committee and the development of a joint report.

The subject of anatomy is conventionally subdivided into gross anatomy, microscopic anatomy or histology, and embryology for this purpose and the consideration of these branches has been undertaken by the chairman, Dr. Chamberlain, and Dr. Lentz, respectively.

In adopting this procedure the committee feels the need of emphasizing the essential unity of the whole subject of anatomy and regards as a serious pedagogic error the unnaturally sharp division of the branches of the subject, which is still prevalent in the organization and instruction of some of our veterinary schools. In this respect we might well pattern after the methods of the better type of medical colleges, in the great majority of which all of the anatomical work is included in one department. This is necessary in order to attain reasonable efficiency, co-

incident with the minimum expenditure of effort and money, and for the following reasons:

1. It is the only means by which the proper correlation of the various branches can be ensured and the student enabled to gain a comprehensive and connected knowledge of the whole subject.

2. It is the only certain way to prevent unnecessary duplication of instruction and equipment.

3. It is the only favorable arrangement for advanced and graduate work, and thus for the broad and thorough training of men for research and teaching.

The foregoing advantages are of the greatest importance and there is little to put on the other side of the scales except prejudice, tradition and inertia—a trio which always stands in the way of progress. Unfortunately the situation is complicated by personal, departmental or college jealousies in many cases and administrative authorities often prefer to "let sleeping dogs lie" in the hope that "things will work themselves out" or that death or mundane translation will remove some obstacles from the path of unpleasant duty.

Probably the only arguments which have been brought forward against the modern type of organization that are worthy of any consideration are (1) that it tends to inhibit specialization; and (2) that the practical applications of the subject are sacrificed; while the scientific or morphological aspects are unduly emphasized.

With regard to the first of these objections it may seem to be merely uttering a platitude to say that too early and too narrow specialization are to be avoided, but sometimes these obvious facts need to be reiterated. One becomes painfully aware of such need when we are confronted with the pedagogic crime of a man being put in charge of instruction in a major subject or an important branch immediatley after graduation. On the other hand, experience has fully demonstrated that in a well-organized department judicious specialization is encouraged and coöperation in teaching and investigation soon becomes habitual.

With regard to the objection that in some departments the purely morphological or scientific data and concepts are emphasized at the expense of facts of immediate professional importance and of practical applications, it must be admitted frankly that this is quite too often the case and that it is a very serious

defect in instruction. But this is not really a defect of organization. It is essentially a defect of personnel and is one which is by no means confined to the anatomical part of the curriculum. In many cases it is due to the instructor's lack of knowledge of the subject, who, of course, can teach only that which he knows something about. In other cases the teacher has little or no knowledge of, or interest in, the special requirements of veterinary students. Instances are not wanting of a feeling on the part of a professor that it is really beneath his dignity to teach veterinary students and that he cannot condescend or trouble himself to organize the work to meet their needs. The incorporation of two or more of these deficiencies in one instructor is by no means uncommon and the embodiment of all of them has been observed repeatedly.

It is generally admitted without argument that sound, practical and lasting anatomical knowledge is almost exclusively the product of careful and methodical work in the laboratory. But it is not sufficiently comprehended that such information can only be acquired slowly by the average student and that it is therefore necessary to make very full provision in the schedule for this work. Still less does it seem to be realized that the training which the student should receive in the anatomical laboratory, in making full and accurate observations on the material and in acquiring the greatest possible skill in handling instruments, is of extreme value in subsequent courses, especially surgery, physical diagnosis and pathology. In order to make the transfer of this training as complete as possible it is essential that the methods used in the anatomical work should approximate as nearly as is feasible those to be employed in the courses in which the results of anatomical study are to be applied. Probably the best concrete example of what is here intended is the practice of studying the structure of the living animal by careful and thorough inspection and palpation. The writer has advocated this procedure for a good many years and is firmly convinced that college authorities make a very serious mistake if they fail to provide adequate facilities for this most valuable means of correlating the anatomical and clinical branches. In the limits of this report no detailed statement can be made of the numerous advantages of the method here strongly recommended. Many of these advantages will be evident at once to any wide-awake clinician and to every anatomical teacher who is sufficiently aware of clinical requirements in this respect. The

facilities for carrying out this mode of study and instruction are essentially the same as those for any other modern and strongly objective method, viz., necessary provision in the schedule for time, adequate quarters and material and sufficient well-trained and experienced instructors. Good results can be obtained only when students are handled in small groups; the number of students in each group should, if possible, not exceed six. Subjects for this purpose should be kept immediately adjacent to the dissecting room, so that they are promptly available whenever desired during dissection, thus avoiding loss of time and disorganization of the work. The method should be used in connection with the study of the skeleton and should be continued thereafter throughout the anatomical courses. In this way the student acquires skill and accuracy in observation and palpation, as well as genuinely practical knowledge, which furnishes a secure foundation for good clinical work. Scarcely less important is the fact that he gets an insight into the practical applications of his hard-earned anatomical knowledge and naturally takes a greater interest in his work. Finally, in conformity with the well-established psychological principle of association, the facts become more firmly established in his mind and can be readily recalled when needed.

In the dissecting room students should use the same kind of instruments as are used in surgery, as far as this is possible. At the beginning he usually needs to be taught how to handle them properly, to keep them clean and in good working order. Experience shows that very few students know how to sharpen a knife and instructors should demonstrate this very elementary but essential procedure at once to prevent students getting into the bad habit of attempting to dissect with a blunt scalpel. Scissors—which should have both points blunt—are still not used nearly as much as they should be in dissecting. Perhaps this circumstance has had an important influence on veterinary operative technique; it is a notable fact that many veterinary surgeons use scissors to a very small extent as compared with their confreres in human practice. A very large amount of dissection can be done much more rapidly and effectively with scissors than with scalpels, and the acquirement of skill in this respect is good training for rapid, yet clean and safe, operative procedure later on.

The principle and practice of conservation in surgery have long been regarded as fundamental. But there has been little

recognition of this idea in veterinary dissection until recently. Of course in the days of short courses and unpreserved subjects, dissection was largely a race against time and decomposition, and speed was therefore a prime necessity. In these days there is no such excuse for rough and slovenly work, at least in those colleges which allot a proper amount of time and instructional force to the anatomical department. Students should be taught, for example, that careful dissection and study of the fasciæ are necessary, since they are in many respects of great surgical importance and of much physiological interest. Some of us can recall that in our student days these ubiquitous membranes seemed to be regarded simply as a nuisance which concealed structures of real importance, and were therefore to be dealt with in the most summary manner possible. Similarly the limits of the joint capsules, synovial sheaths and bursæ should be studied accurately. It seems decidedly advisable to require a student to dissect and learn the larger vessels and nerves even during the first year's work, when his chief concern is to gain a thorough knowledge of the bones, joints, muscles and viscera. The reasons for this are: (1) That he may not get the careless habit established of reflecting skin, fasciæ and muscles without looking out for underlying structures—a habit difficult to overcome later when such procedure will prevent acquiring the kind of anatomical knowledge necessary for the successful practice of medicine and surgery. (2) That the student may acquire a sufficient working knowledge to form an adequate basis for good topographic dissections and for intelligent use of sections.

It would seem that the pedagogic difficulties which confront anatomical teachers are not fully appreciated by college authorities or even by their colleagues. These difficulties have increased during recent years until the conscientious teacher sometimes almost despairs of meeting them successfully. With the passing of the horse doctor type of specialist and the great extension in the range of anatomical knowledge required in the clinical years of the curriculum, the problem of selecting from the vast array of anatomical facts those which are actually essential, tests severely the judgment and courage of the most experienced teacher. The physiologist, the pathologist, the surgeon, the professor of medicine each demands that the student must come to him provided with certain categories of anatomical facts. The sum of these irreducible minima is almost staggering, and it must be attained in two years by students fresh from the often

painless methods of the high school, who must first be taught how to observe and to accumulate a difficult scientific terminology.

Attention may properly be directed here to an unfortunate and quite unnecessary difficulty encountered by instructors and students of anatomy. The reference is to the archaic and confused anatomical terminology which persists to a great extent in clinical instruction and literature. This is a serious hardship to the student and should be remedied promptly. It is high time clinical instructors ceased to speak or write of os innominatum, extensor suffraginis, flexor metatarsi, Steno's and Wharton's ducts, right and left sacs of the rumen, plantar nerves of the fore limb, etc. It should be clearly recognized that the determination of anatomical names and facts is to be left in the hands of their anatomical colleagues. It is true that anatomical terminology has been in rather fluid state during the past decade, but it is equally true that great progress has been made in this respect in the anatomical instruction of our colleges; many useless synonyms have been dropped, undesirable names eliminated, and a long step taken toward a more uniform and sensible nomenclature. This change has removed a heavy burden from students in this very important branch, thus allowing their energy to be devoted more exclusively to the acquisition of really useful knowledge. It is very unfair to the student and entirely indefensible from a pedagogic standpoint that clinical instructors should attempt to inflict on him a mass of obsolete terms, many of which are no longer to be found in any anatomical work known to the student—some of them, in fact, have never occurred in any book on anatomy. Much of our clinical literature is badly in need of revision in this respect, and the opportunity might well be utilized to bring it up to date in other directions. It is earnestly desired by anatomical teachers that they may have the prompt and thorough coöperation of their colleagues in other branches in this matter.

But other difficulties are not so easily disposed of. The selection of matter is one of the hardest problems, as has already been indicated. We may eliminate minor attachments of muscles (especially those which are deep-seated), ignore the smaller vessels, and deal as briefly as possible with the finer structure of the central nervous system and sense organs as is consistent with the demands of physiological study. On the other hand, we may emphasize those regions where injuries and abscess-formation are

most common and where operations are frequently necessary. But shrapnel fragments, barbed wire and other traumatic agencies do not exercise any perceptible selective action, and in such cases the practitioner usually has no opportunity of refreshing his memory by reference to the literature.

The problem would be greatly simplified in some respects if it were known what field of activity the student intended to enter. But this matter is not usually decided till late in the course, and in many cases not then; often radical changes of work are made after graduation without any special preparation therefor. Some of our best medical schools are beginning to offer selective courses, partly to relieve the congestion in the required work, and partly to meet the needs of specialization in practice. Similar action in the veterinary colleges would no doubt be indicated if our students had as good biological training as is now required for entrance to the medical colleges, provided also that specialization in practice was established. Even under our present circumstances a small amount of elective work seems desirable. But this does not help matters much, as such work is chiefly additional and does not replace required courses.

It has long been customary to devote a considerable part of the time to routine lectures on anatomy. This practice must be abandoned or at least a great reduction made in the time so utilized. It is becoming generally recognized by thoughtful teachers that the lecture method is relatively inefficient and that the time can be much more effectively employed in quizzes and demonstrations. It is sometimes urged that the lecture is the best means by which the instructor can select the material and emphasize matters of greatest importance. But in general these desirable results can be secured better by the quiz and by laboratory conferences and demonstration. In addition the latter methods provide the only adequate and reliable means by which the instructor can keep constantly informed as to the progress of his students, and—a no less important desideratum—the student can gauge his success in his work. One of the most valuable features of the recitation is the training it gives the student in expressing himself accurately and clearly. In a properly conducted quiz the student is required chiefly to state the results of his observations in the laboratory, and it should not be possible for him merely to repeat statements which he has read or heard in lectures. It is decidedly stimulating to the student to know that he will frequently be called upon to demonstrate his

knowledge of the subject and that his views will be subjected to the criticism of the instructor and of his classmates.

It must be admitted with regret that, with very few exceptions, our colleges have not made even fairly good provision for successful anatomical instruction. In general the quarters allotted to the anatomical department are inadequate and not well designed for the purpose, salaries are insufficient to obtain or to retain well-trained instructors, and sufficient funds are not available for equipment and material. This state of things cannot be permitted to persist in the development of our educational facilities if anatomical teachers are to be held responsible for the proper training of students in this important branch, on which so much of the subsequent work is based in a large degree. It would seem desirable that administrative officers inform themselves as to what has been done in this matter by the better class of medical schools, in which the anatomical department has received its due share of funds and facilities.

A good museum has always been regarded as an important feature of the college plant. Too often, however, it is chiefly a storeroom or a heterogeneous assemblage of curiosities and material of little instructional value. The development of an anatomical collection which is constantly and effectively used for teaching purposes is a very different matter; its maintenance, growth and utility involve a large amount of expert work and no small expenditure. In order to furnish the desired information and to be directly available for inspection and study, specimens must be carefully selected and prepared, properly installed in containers and cases so as to be visible, and labeled and catalogued in order to be found readily. So far as possible the arrangement should be such that the specimen need not be removed for examination. In some buildings, halls and corridors can be used for the installation of cases containing specimens to which reference is frequently desirable. The placing of skeletons and other bone preparations (preferably in cases) in the dissecting room is very useful, as it furnishes the student with the means of refreshing his memory with regard to areas of muscular and ligamentous attachments, vascular and nervous relations to the bones, visible and palpable prominences, etc.

In addition to constant supervision in the dissecting room students should be provided with printed or mimeographed dissection guides. This ensures orderly and effective procedure and trains the student in careful and systematic methods of work.

It also conserves the time and energy of instructors and makes it possible for them to demonstrate important points, assist the student in technical difficulties, and quiz on the material in hand. Tact and judgment should be used in answering questions and students should not be furnished with information which they can obtain without special difficulty. "Spoon-feeding" is highly undesirable in the case of men who are preparing themselves to solve the problems of medicine and surgery.

Another difficulty is the matter of linking up the anatomical work with related branches of the curriculum. The need of correlation is of course unquestioned. The problem is to secure this correlation without undesirable overlapping. It has long been customary in anatomical study to deal with the action of joints and muscles and it is no doubt desirable to allude briefly to the functional significance of other structures. Pathological and clinical implications may also be mentioned with advantage at certain points. But considerable care is needed in this procedure, as there is a real danger of dislocating the student's attention from the main object, viz., the acquisition of anatomical knowledge. It seems best to ensure a fuller comprehension on the part of the student of the professional objects of anatomical study and of its relations to the patholgical and clinical branches by means of a course in applied anatomy which is organized in content and method for this specific purpose.

In order to keep this report within reasonable limits it has seemed necessary to confine attention mainly to principles and methods, and thus to omit consideration of some materials of instruction, such as X-ray and other photographs, charts, lantern slides, models, etc. Reference to these and other matter of interest may develop in the ensuing discussion.

Teaching Histology.

(F. W. Chamberlain)

Teaching of any subject is an art. The artificer only is efficient and his efficiency depends on, first, his knowledge of the subject, and, secondly, his adaptability. Knowledge of a subject comes to one only after years of experience, thus in the teaching of any subject the teacher shall have had long experience and should possess such temperament or mettle that he makes constant progress.

At this institution, from its inception, and as a part of the veterinary curriculum, anatomy, both gross and microscopic, has been handled by one department. It occurs to the writer that this correlation of anatomy subjects has no disadvantage, while, on the other hand, it has every advantage. It permits the work to be so arranged that the student becomes familiar with the tissues and organs, their origin and structure, in such a manner that the animal body is revealed to the mind completely and without repetition. Repetition tends to familiarity but it also tends to incompleteness.

The relation of anatomy to other subjects ordinarily incorporated in a veterinary curriculum is such that it should precede physiology and pathology and should be given coincidently with chemistry and physics.

Turning our attention to histology specifically, the writer is not in favor of occupying the student's time with extensive lectures. When lectures are desirable they may be presented to students in printed form, thus saving time for the student which may be utilized to precede laboraotry work, with explanations and demonstrations consisting of specimens gross and microscopic, the latter through the use of a projectoscope or microscope and charts and models.

Following the above preliminary work the student should study the tissues and organs in microscopic preparations while referring to notes and some good text. The principal object to be attained in the teaching of histology is a knowledge of the normal tissue in a comparative sense and to enable the student to identify the same by the arrangements of cells and tissue. To this end much practice should be given the student when he is studying with the microscope to identify systematically the cells and tissues of tissues and organs respectively, after which he should make pencil drawings of the same and in such manner as to show structure. Sufficient laboratory technique should accompany the work to familiarize the student with the preparation of tissue and organs for microscopic study, but not the extensive work of the technician.

Work with the microscope should be followed by complete constructive quizzing, in which the student is led to build up hypothetical tissue and organ. The destructive quizzing employed by some teachers is to be discouraged as a waste of time and a detriment to the student by destroying his confidence.

Time to cover the work in histology should approximate 200 hours; 50 hours' demonstration and quizzing and 150 hours for laboratory work, which time may be subdivided according to subjects approximately as follows:

Subject	Lecture	Laboratory
Tests	3	6
Cell	3	8
Epithelial tissue	2	6
Connective tissue	4	12
Blood and lymph	4	14
Muscular tissue	2	6
Nervous tissue	2	6
Blood and lymph systems	3	8
Digestive system	6	20
Respiratory system	1	4
Skin and appendages	2	8
Central nervous system	4	12
Organs special sense	5	12
Female generative organs	2	6
Male generative organs	2	6
Urinary organs	2	6
Technique	3	10
Totals	50	150

Grading of work is based on the results of written and microscopic tests and laboratory drawings.

An attempt has been made by the writer to combine the courses in embryology and histology and with very favorable results. With the additional time given to embryology and the lack of repetition much time is saved and the subject more completely covered. The time given to the subject is 22 lectures and 33 laboratory hours, which should be distributed through the course.

Teaching Embryology.

(William J. Lentz)

Because of the great importance of embryological interpretations in understanding adult tissues and in that embryology explains much in normal and abnormal conditions and through its knowledge the veterinarian is able to intelligently understand and correct defects that he is called upon to remedy, it is without question an important fundamental study and should receive more attention than is usually accorded it. In a four-

year curriculum I believe that a laboratory course should cover about 72 to 90 hours and as many accessory lectures as time permits, at least one a week, unless the work in Histology is arranged on an embryological basis in which the development of each organ is taken up as an introduction to the study of its microscopic structure in the adult. If this much time is not available the student should certainly at least take up the development of the chick during the first eight-ten days, macroscopically and microscopically, and supplement that with sections of the pig at two or three stages and should most certainly know of maturation, ovulation, spermatogenesis, fertilization and the formation of body wall and amnion, and also general organogenesis and especially placenta formation and the various types, also dentiton in its early stages. To me a knowledge of embryology certainly seems essential to an ideal veterinary course and the student should have not less than at least one semester's work in comparative embryology.

Dr. F. A. Lambert has resigned as Assistant Professor of Comparative Anatomy in the College of Veterinary Medicine, Ohio State University, effective at the end of the present academic year. Dr. Lambert has accepted the position of Ohio representative for the Lederle Antitoxin Laboratories of New York.

Dr. Lambert was discharged as Captain, V. C., U. S. A., recently and returned to the university to complete the academic year. He was from September 1, 1918, to January 16, 1919, Commanding Officer of the Veterinary Battalion in the M. O. T. C. of Camp Greenleaf and is therefore widely known to veterinarians in practically every State in our Union. In resigning his connection with the Ohio State University, Dr. Lambert severs a position long held. For since his undergraduate days he has been a protege of Professor S. Sisson. For three years also, 1915 to 1917 inclusive, he served the State Veterinary Medical Association as secretary. Dr. Lambert will continue to make Columbus his home and headquarters.

Major E. B. Ackerman, late of the Army Veterinary Service, filled the role of veterinarian to the Brooklyn Riding Club horse show in April.

Dr. Robert McCully of New York acted as veterinarian to the indoor horse show at Durland's riding academy in May.

COMMUNICATIONS.

Chicago, Ill., May 14, 1919.

Editor, Journal:

A question has been raised with reference to the code of ethics of the A. V. M. A. and refers particularly to Section 7. This section reads: "It shall be deemed a violation of the code of ethics for any member of this association to contract with or through the officers of any live stock insurance company for the professional treatment of the member's stock so insured, but this rule shall not prevent any member from becoming an examiner of risks and acting in the capacity of an expert for the same."

It is claimed by some members that this places members of the A. V. M. A. at a disadvantage as compared with practitioners who are not members of the A. V. M. A. and who are at liberty to sign such a contract. It is also pointed out that this class of veterinary work is becoming more important each year and that work of this kind must be done. It is also stated that this work is practically on the same basis as any other contract work for the private company and attention is also called to the fact that certain life insurance companies have a similar contract with physicians who look after their insured.

This is a very important subject and is worthy of careful consideration of members of the association. It is hoped that all those interested will take the opportunity of expressing their ideas on this subject through the columns of the Journal.

N. S. Mayo.

Lafayette, Indiana, April 15, 1919.

Editor, Journal:

The Extension Department of Purdue University has endeavored to make it possible for every class interested in agriculture or live stock in Indiana to receive the benefit of the knowledge of the most learned men in the country on the various subjects pertaining to the two above-mentioned industries. Just recently the veterinarians of Indiana had the privilege of hearing Dr. W. W. Dimock of the Iowa State College discuss the differential diagnoses of swine diseases. Six different points in the State were selected where meetings were held. The points most convenient for the local veterinarian to reach were consid-

ered in each selection. The State Veterinary Department and B. A. I. force gave splendid aid in making these meetings a success. The total attendance was 251 veterinarians.

It is the intention of the Extension Department to bring on different specialists in the future to discuss the various diseases prevalent in Indiana. Arrangements have been made to bring in Dr. W. E. Cotton, Assistant Superintendent of the Experiment Station at Bethesda, Maryland, Bureau of Animal Industry, to discuss contagious abortion disease before the Indiana veterinarians. These meetings have been scheduled for the first week in June, from the 2nd to the 6th, inclusive. The itinerary has not been made out at the present time, but it will appear in the June issue of this Journal. The next series of meetings will probably be held about the first week in October.

In conclusion, I feel obligated to pay my respects to Dr. Dimock for the splendid manner in which he handled his subject before the Indiana veterinarians. The boys from Indiana will not soon forget Dr. Dimock, and it will take time for them to realize the benefit derived from attending the meeting where Dr. Dimock spoke.

A report of future meetings will be sent to this Journal.

L. C. KIGIN, Extension Veterinarian.

Lima, Peru, March 10, 1919.

Editor of Journal of A. V. M. A.:

As a Danish veterinarian (though born in the States) I should like to call your attention to an interesting paper by a Dane published in August in a Danish veterinary journal (Maanedsskript for Dyrloger), "The Etiologi and Pathogenesis of Milk Fever."

The paper (translated in German) has been awarded with diploma for degree of doctor of veterinary medicine by the medical faculty of the University of Leipsig.

A Dane (Schmidt of Kolding) being the inventor of the first effective treatment of the disease, I should like Americans to know that another Dane, Dr. Med. Krogóe-Petersen, has issued a paper that seems to furnish a very attractive and adequate explanation of some of the darkest mysteries of the disease. The secret lies apparently in the *falling* of the barometer.

If you care for a report on it I can offer the following:

"Etiologi and Pathogenesis of Milk Fever" (Kalonings Feberens Etiologi of Patogenese) Krogóe-Petersen. Maaneds-

skript for Dyrloger, Bind. 30, No. 9, August, 1918, pp. 225-346. Translation in German awarded doctor's diploma by medical faculty at the University of Leipsig, Germany.

The author calls attention to the well-known fact that the disease, on acount of conditions favoring it, such as rational breeding and increased milk production, etc., is a comparatively new disease. A Danish veterinarian, Professor Carl Viborg, described the disease in 1818.

Since then an endless lct of theories and hypotheses have been set up and the author gives an account of the most important ones to show how different and confusing they are. A popular and old conception among lays in Denmark is that the cause is a transmission of the milk into the blood.

Harms believes in an airembolus in the brain through the entrance of air in the vessels of the uterus. Hess and Guillebeau believe in infection and intoxication. Franck believes in an anemia in the brain on account of serous extravasation in this organ. Kaiser supposed the cause was the work of bacteria in the bowels. Thomassen believes in infection of the udder as the cause. Nocard finds cocci in the uterus. Erhardt speaks of chronic intoxication during the preceding dry period suddenly becoming acute by parturition.

There are mentioned many other theories and hypotheses, such as collateral anemia of the brain, corresponding to hyperemia of the udder or anaphylactic phenomena of the production of milk. A Dane, L. Andersen, Gimlinge, has proved several years ago that the mortality is low by rising barometer, but high when the barometer is falling, but draws no further conclusions.

The idea of Schmidt, Kolding, was that there were produced certain toxins in the udder, and consequently his first treatment was to inject a solution of K. I. in the udder, and besides he used massage. Later he modified the treatment.

The author then criticises the theories founded on intoxication and infection, pointing out the essential difference between certain well-known and recognized intoxications with their positive anatomical changes and bad prognosis on one hand and, on the other hand, the complete and often wonderfully quick recovery of the milk fever cows, and, moreover, the practically negative postmortem in case of death of the latter. Some changes often reported in milk fever patients, such as necrosis of muscles, are shown to be non-specific. Moreover, there is mentioned the

improbability of intoxication or infection in animals so apparently healthy as these patients. The author calls attention to the likeness between the symptoms, etc., by bleeding to death (internal hemorrhage) and milk fever. The author states that milk fever is no absolute puerperal disorder, he himself having treated at least twenty typical cases several months from the time of parturition. The author noticed, after having practiced a few years, that he very often was called to milk fever cows in snowstorms, or at least almost always in bad weather, and began studying the barometer in relation to the disease. He found that, as a general and almost infallible rule, the cases all occurred immediately after a falling of the barometer from any height or when the barometer was very low. In some cases it could be steady, or even slightly rising, but in these cases it was always very low.

During three years he has collected 516 cases, partly from his own practice and partly from eleven neighboring veterinarians. Several tables show that the disease practically always occurs during the falling barometer, or when the barometer is very low. A few cases (that seem to have nothing to do with the barometer) occurred during sudden unusually hot spells.

The writer states that many cases of the so-called chronic indigestion in cows most probably are cases of milk fever several months after parturition, because the "air treatment" helps and often cures many of these cases.

He states that (as shown by the tables) the severity of the particular cases is proportional to the fall of the barometer, so that a case occurring in consequence of a rapid and considerable falling is severe, and the recidives after treatment usually occur in accession to a continued falling or low height of the barometer. The author resumes: (1) Milk fever always appears in concurrency with special meteorologic circumstances. (2) The great majority of the cases occur either with falling barometer from any height or when the barometer is very low, lower than normal (760 mm.). (3) In very few cases milk fever will occur during a sudden unusual hot spell and apparently independent of the barometer. (4) Some cases occur with falling barometer and at the same time unusual hot spell. The cases pertaining to (2) occur during, or the day after, the falling of the barometer, or they occur during, or the day after, a very low height of the barometer. The severity of the attack in this group varies greatly, but the ones treated the "day after" are usually recovering

or not severely attacked, and the disease usually has been noticed the day before treatment. The cases pertaining to (3) are severe and the cases pertaining to (4) especially severe.

The author then explains the reasons that make him believe that the barometrical changes are the primary cause of the disease, and he says: If the decrease of atmospherical pressure is the cause, then an occasional rising of the barometer during the attack ought to be able to cure the disease, and this is exactly what very often does happen. As a further proof for his theory the author calls to attention the work mentioned by L. Andersen, Gimlinge, in 1894, treating 217 cases. According to this paper, the percentage cured during rising barometer was almost equal to that of our modern air treatment and even better than the very first treatment of Schmidt, Kolding (1896). Further, he says: The total surface of a cowhide being about six square meters, a decrease of 10 mm. pressure in the barometer corresponds to a total decrease of pressure on the cowhide of 816 kg. Moreover, he points to the symptoms so well known from the sudden evacuation of large quantities of liquid from serous cavities.

Several other propositions from human medicine are mentioned hereby drawing parallels.

The author then explains the means by which the falling pressure influences the patient and draws attention to the extraordinary richness of blood vessels in the skin and udder of a good milch cow. The sudden decrease of pressure gives a hyperæmia in these parts. Rubeli has shown that an extirpated cow's udder weighing 14 kg. will hold 10 liters liquid in the blood vessels, besides 3 liters in the cavities of the glands. The sudden evacuation of the abdominal cavity by birth gives a strong dilation of the vena porta system. All this gives a considerable decrease of the total blood pressure, besides a strong collateral amemia in the brain, with stagnation of the blood in this organ, a decrease of the common vital functions and secondary autointoxication, with elimination of sugar and albumen in the urine, and finally death, nervi vagus and sympatheticus react for the cerebral anemia and there appears "vagus puls" and digestive disorder (typmpanitis and paresis of the bowls).

As a further proof for his hypothesis is mentioned that milk fever can be cured by injection into the jugular vein or the udder of aqueous solutions of several different things, besides by sodium chloride (Na Cl) solution alone; all things which con-

tribute to recover the sufficient blood pressure. Adrenalin (suprarenin) injected (subcutaneously) hypodermically cures the disease as readily as does the modern air treatment.

In a later copy of maanedsskript for Dyrloger, the author says that it has been noticed that when milk fever occurs far from the time of birth it mostly occurs during estrum, which means at a time when the genital organs are highly congested.

It is hard to give an adequate extract of the paper, but it seems to me that it is of general interest. Besides the scientific part of it, it is apparently of importance to the practitioner as a help to the diagnosis, prognosis and general understanding of the disease. F. KLEE, Danish Vetr.

Lima, Peru.

An interesting communication has been received from Dr. D. Warnock, Victoria, British Columbia, and after referring to some business matters, the Doctor says:

"After four years of strenuous service with the British Remount Commission and, tempted by this fine climate, I have accepted the position of Deputy Minister of Agriculture and head of the live stock and veterinary branches of the province of British Columbia, with headquarters at Victoria.

"I was Senior Veterinary Officer at Lachine Remount Depot for a year and a half when I was promoted to Commanding Officer, which position I held till demobilization last month.

"We handled many thousand of remounts, chiefly from your side of the boundary, at Lachine and it was a valuable experience.

In June, 1918, I was honored by being appointed "an officer of the Most Excellent Order of the British Empire" for my services in the war.

"I may be able to get you some candidates for membership when I have had time to become better acquainted and shall bear the A. V. M. A. in mind. I am no longer a member of the House of Commons, as I was too busy to accept the nomination in the general election of 1914."

Major Harry F. Steele of the Regular Army Veterinary Corps, who was relieved from service "Over the Seas" because of a bronchial affection, has recovered sufficiently to be assigned to duty at the Remount Station at Fort Sam Houston, Texas.

NECROLOGICAL.

DR. DAVID E. WRIGHT.

Dr. David E. Wright, who retired from practice at Reno, Nevada, in November, 1916, owing to ill health, died of tuberculosis at Colfax, California, March 28, 1919.

Dr. Wright was born at Logan, North Dakota, July 30, 1891, and graduated from the New York State Veterinary College, at Cornell University, in 1912. He was a member of the Omega Tau Sigma fraternity, Orleans Lodge No. 55, F. & A. M., Barton, Vermont, and the A. V. M. A. He was unmarried.

Interment took place at Colfax, California, under the auspices of the Masonic lodge of that place.

A BILL THAT OUGHT TO PASS.

We understand that a bill is to be presented to the Michigan Legislature to provide for the testing of tuberculous cattle used for milch and breeding purposes within the State; to provide the method of making such test; the record of the same; the disposition of cattle afflicted with the disease; and to provide penalty for violation, etc.

We further understand that the passage of the bill is favored by health authorities generally, and that Dr. George H. Carter of Saginaw is one of the leaders in this progressive movement.

Any intelligent and practical measures that can be taken to aid in eliminating this fell scourge should receive the hearty endorsement of all right thinking people; and the Journal congratulates its Michigan friends in the important step they have taken. May their efforts be crowned with success.

Lieutenant Frank T. O'Sullivan of New York of the Veterinary Service of the A. E. F. has been honorably discharged and returned to practice in New York.

Dr. W. N. Gaston has located at Peterson, Iowa.

MISCELLANEOUS.

ONTARIO VETERINARY COLLEGE.

GRADUATING EXERCISES.

The graduating exercises of the Ontario Veterinary College were held on Tuesday, April 29.

Addresses were delivered by the Hon. George S. Henry, Minister of Agriculture, Dr. J. G. Rutherford, C. M. G., Board of Railway Commissioners, and Dr. F. Torrance, Veterinary Director General.

In the course of his address the Minister mentioned some of the achievements of the live stock breeders in Ontario. He also referred to the importance of maintaining live stock interests and appealed to the graduates to coöperate with representatives of the Department for the further development of the live stock industry.

Dr. Rutherford outlined the advantages which the present graduate had, and the position he should occupy in the community for the rendering of efficient service. In particular he emphasized the need for adjusting veterinary education and training to meet the changed conditions, and for more consideration to be given to the breeding, management and improvement of all classes of live stock and the importance of preserving the health of food-producing animals and increasing their productiveness.

Dr. Torrance in his address gave testimony to the value of veterinary science and service. Firstly, by the work of the Army Veterinary Corps during the war. As a result the wastage of horses was kept much lower than during other wars and also greatly assisted in winning the war by maintaining horses in good health and fit condition for artillery and transport service. Secondly, by protecting the live stock of the nation from the ravages of contagious diseases, particularly foot-and-mouth disease, which was stamped out in the United States and prevented from entering Canada. He also made a protest against the granting of diplomas and so-called degrees by correspondence schools.

THE ATTENDANCE.

During the last session the number of students amounted to 70 in all classes. Of this number 39 were in the graduating class, and on passing the examinations were granted the diploma of the college. Included in the graduating class were ten students who enlisted at the outbreak of the war and were returned from active service overseas under routine military orders to continue their professional training. This indicates the importance attached to veterinary training by the military authorities. With the war over it is hoped that the attendance will again return to normal proportions.

EXPANDING THE COURSE OF INSTRUCTION.

The college course now requires four sessions attendance for graduation. Each session comprises seven months, extending from the first of October to the first of May. In view of the extension of the course from three years to four years attendance, an expansion and rearrangement of the curriculum was possible. Several new subjects were added, including Clinical Diagnostics, Practical Meat Inspection, Physics, Biochemistry, and Public Speaking. The subjects of Physics and Biochemistry are being taught at the University of Toronto. The instruction in Clinical Diagnostics should be further extended to include all classes of live stock. The extension in this direction would materially improve the training of the students for general practce and permit of better service being rendered clients in the treatment of diseases affecting farm animals. The training in Public Speaking showed beneficial effects in students by improving their rhetoric as well as their knowledge of the proper procedure in the conduct of meetings. The work of Practical Meat Inspection was conducted at the large abattoirs under the supervision of the veterinary inspectors of the health of animals branch.

Further adjustments and expansion of the course of instruction and training may be required owing to the transition of veterinary usefulness to a greater extent from the city to the country. This is incidental to the somewhat lessened demand for certain classes of horses in cities and to the constantly increasing demand for skilled veterinarians in the farming communities.

SPECIAL FEATURES OF VETERINARY TRAINING.

In addition to training students for general practice as veterinarians, the college also trains them for scientific pursuits and to conduct research work which may tend to solve live stock problems occasioned by obscure diseases interfering with animal industry and causing economic losses.

It also trains the student for special veterinary sanitary service work in preventing and suppressing contagious diseases of animals and in lessening the transmission of communicable diseases of animals to mankind through unwholesome milk supplies and from meats and meat food products of doubtful origin. The inspection of animals intended for export or slaughter is essential for the establishment of an export trade with Great Britain and the United States, as these countries have import regulations strictly requiring veterinary inspection and certification of all live stock and of all meat and meat food products before leaving Canada. Veterinary colleges therefore serve an important national function for the upbuilding of an export live stock and dressed meat trade from Canada by properly training students for the work of veterinary sanitary service.

ADVANCING THE STATUS OF THE GRADUATE.

In order to improve the status of the graduate, the Hon. George S. Henry, Minister of Agriculture, had the act respecting the college amended at the last session of the Legislature. The change will have the effect of discontinuing the granting of diplomas by the college and will enable students hereafter to obtain the uniform degree of Bachelor of Veterinary Science (B. V. Sc.) from the University of Toronto. It will also have the effect of raising the standard of entrance by placing the requirements for admission under the direct supervision of the university. Hereafter applicants for admission will be required to furnish a certificate of at least two years high school or collegiate education or pass an equivalent qualifying examination prescribed and conducted by the University of Toronto. It is hoped that these changes, which are progressively in keeping with the standards of accredited veterinary colleges in other countries, will have the effect of attracting a superior class of young men to enter the profession.

Major E. V. Lusk of the Regular Army Veterinary Service is steadily recovering from the serious illness for which he was returned from "Over the Seas" duty to Lakewood, New Jersey.

OKLAHOMA NOTES.

The State Board of Veterinary Medical Examiners met in the Capitol on April 28, 29 and 30 and examined seventeen applicants, eleven graduates and six non-graduates. The names of graduates who took the examination are as follows:

V. O. Cudd, St. Joseph, Mo.
E. Murphy, Ardmore, Okla.
E. W. Meads, Claremore, Okla.
W. S. Rader, Broken Bow, Okla.
Arthur W. Deems, Fairview, Okla.
Andrew Gillespie, Frederick, Okla.
William Poseiner, Muskogee, Okla.
J. F. Chamberlin, El Reno, Okla.
H. E. Gearhart, Kaw City, Okla.
W. Heffelman, Grove, Okla.
L. F. Bacon, Cedar Falls, Iowa.

Lieutenant William T. Vilott, who has been with the Veterinary Corps in France, has been reinstated to his former position in the meat inspection service at Oklahoma, Okla. He saw some very active service in the vicinity of Chateau Thierry.

Evard A. Dean has resigned his position as veterinary inspector and is practicing at Guthrie.

L. B. Fox, who has been a veterinary inspector at Oklahoma City for the past year, has been transferred to Holbrook, Arizona, to engage in dourine eradication.

Veterinary Inspector H. A. Michel, recently transferred to San Angelo, Tex., has resigned, taken a wife and moved to his former home in South Dakota.

J. P. O'Connor, inspector in charge of hog cholera control, has resigned and formed a partnership with Dr. Ben Dobkins at Vinita, Okla. Dr. Dobkins finds it necessary to devote most of his time to his banking and agricultural interests.

The State Veterinary Medical Association will meet at Oklahoma City June 30 and July 1. The date has been changed to avoid conflicting with other State meetings. A good program is assured.

G. W. Jones, formerly a veterinary inspector on the Chicago force, and more recently with the Quartermaster's Department, U. S. Army, has accepted a position with the Eagle Serum Company at Oklahoma City.

J. C. Freeman, President of the State Board of Veterinary Medical Examiners, recently released from the Army Veterinary Corps, has resumed his practice at Enid.

J. S. GROVE, Resident State Secretary.

NUPTIALS.

Dr. Benj. D. Pierce of Springfield, Massachusetts, informs the Journal of the marriage of Dr. Henry Edward Holden and Miss Elsa Ida Allen, at Springfield, Massachusetts, on April 10.

In speaking of the bridegroom, Dr. Pierce says: Dr. Holden has been one of our leading veterinarians for twenty-five years or more and is a successful practitioner, a good fellow and a good neighbor; and after living for fifty years or more a life of single blessedness, it will surely surprise his many friends to hear of his change.

Dr. Holden is a graduate of Liautard's School about 1891. I think he was an assistant to Dr. F. H. Osgood when he was here in Springfield, and succeeded to his practice when Osgood went to Boston.

The Journal desires to congratulate Dr. and Mrs. Holden, and wishes them health and happiness.

Dr. J. L. Herring of Wilson, N. C., has been elected temporary secretary-treasurer of the North Carolina Veterinary Medical Examining Board. Dr. M. J. Ragland of Salisbury, N. C., has been elected temporary president of the Board to fill the unexpired term of Dr. T. B. Carroll, deceased. The next regular meeting of the Board will be held at Wrightsville Beach on June 24, the State Association convening on June 25 and 26.

Dr. W. A. Hornaday, meat and milk inspector of Greensboro, N. C., has been confined to his bed for five weeks with a complication of typhoid fever and malaria. He is slowly improving but remains quite ill yet.

Dr. T. M. Lee has been discharged from the army service and has resumed his practice at Watertown, Minnesota. Dr. Lee writes that after leaving the training camp at Greenleaf he went to Camp Lewis, Washington.